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A Method for Assessing the Effectiveness of Property Line Noise Control Programs

Bolt Beranek and Newman, Inc.
Cambridge, MA

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A METHOD FOR ASSESSING THE EFFECTIVENESS OF PROPERTY LINE NOISE CONTROL PROGRAMS

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U. S. ENVIRONMENTAL PROTECTION AGENCY
Office of Noise Abatement and Control
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This study describes the basic components found in four active property line noise control programs and suggests a method for assessing program effectiveness. It is for use by local jurisdictions interested in developing property line noise control or assessing current program completeness.

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TABLE OF CONTENTS

page

LIST OF FIGURES AND TABLES vii

SECTION 1. INTRODUCTION 1

1.1 Basic Program Components 1

1.2 Assessment of Program Effectiveness 2

2. STUDY METHOD AND DATA COLLECTION 4

3. RESULTS 7

3.1 Basic Program Components 8

3.2 Method for Assessment of Program Effectiveness 23

4. RECOMMENDATIONS FOR FURTHER WORK 33

APPENDIX A. INFORMATION PROVIDED BY JURISDICTIONS A-1

APPENDIX B. SUMMARY DESCRIPTION OF THE SELECTED PROPERTY LINE NOISE CONTROL PROGRAMS B-1

APPENDIX C. DEVELOPMENT OF BENEFIT ASSESSMENT PROCEDURE C-1

APPENDIX D. COMPLETED CODING FORMS FOR BLOOMINGTON, MN COMPLAINT FILE DATA D-1

Page ii and iii blank.

LIST OF FIGURES AND TABLES

page

Figure 1. Typical flowchart for portion of property line noise control program procedures 20

2. Sample coding form showing columns used for each item number of Table 6 36

Table 1. Jurisdictions with property line noise control programs selected for study 5

2. Noise source types that have produced complaints 10

3. Primary noise source types that resulted in complaints, by jurisdiction 12

4. Five noise source types (excluding barking dogs) that resulted in the largest number of complaint files, based on complaint file data from all four jurisdictions 13

5. Summary of information recorded at each step of the complaint response process 24

6. Description of the final outcomes (remedies) of noise complaint investigations 34

7. Complaint file coding format 35

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1. INTRODUCTION

This study has two goals:

- Describe the basic components of currently active property line noise control programs
- Develop a practical method for assessing property line noise control program effectiveness.

What is a "property line noise control program"? It is a noise control program, generally run by local jurisdictions, that seeks to limit the noise crossing from one person's property to the property of another. The program attempts to control the noise that bothers people where they live. It accomplishes this control by the enforcement of maximum permitted sound levels as measured at the legal boundary between properties. In general, these maximum permitted levels apply to nontransportation, or stationary, noise sources.

1.1 Basic Program Components

Four active property line noise control programs provided the data necessary for accomplishment of the study goals. The four programs provided detailed information about their development and their enforcement procedures. Analysis of this information identified basic program components common to all. The first goal was to understand how four active property line noise control programs work, and to synthesize a generalized model of these programs. Such a model will not only help jurisdictions that are contemplating the initiation of a program, but will also allow jurisdictions with on-going property line noise control programs to assess their own program's completeness.

1.2 Assessment of Program Effectiveness

A property line noise control program is effective if it accomplishes its objective. The objective of all such programs must be to reduce noise impacts, that is, to reduce the adverse physiological and behavioral effects that noise or sound has on people. Assessment of noise impact reduction can be done directly with social surveys of the subject population, or can be done indirectly using measured reductions in noise levels (that result from the property line noise control program).

Social surveys require carefully developed questionnaires and very specific, stratefied samples of the population. In addition, to measure the effectiveness of property line noise control programs, the sample sizes have to be very large; many types of noise sources quieted by property line programs generally do not impact very large percentages of the population. Thus, the program assessment information provided by social surveys can be difficult and expensive to obtain.

Noise reduction information, on the other hand, can be routinely collected by program enforcement personnel. Further, if many jurisdictions collect this information in similar or comparable formats, each jurisdiction could compare its information with that of other jurisdictions; enforcement personnel would learn from each other.

By examining noise complaint files from four jurisdictions, this study identifies information needed to assess program effectiveness, presents a format for collection of information, and suggests specific assessments that jurisdictions can make once the information has been collected.

The next three sections and the appendices describe the study and present the results. Section 2 discusses the general study method and how the data needed for the study were collected. Section 3 presents the results of the study in two parts: basic property line noise control program components; method for assessment of program effectiveness. Section 4 presents recommendations for further work. The appendices provide detailed information about the four jurisdictions studied and a detailed discussion of benefit assessment procedures.

2. STUDY METHOD AND DATA COLLECTION

The study is intended to be pragmatic; it is based on an understanding of how active property line noise control programs actually work. From this understanding, the basic program components are first identified. Then, using these basic components, a method is developed that will permit jurisdictions to better follow the progress of their program and to assess the program's effectiveness.

The first step was to select good examples of active property line noise control programs. Selection criteria were that the program:

- Includes specific sound level limits, enforceable at or near property lines
- Has resulted in a collection of noise complaint file data, reasonably well documented
- Is enforced/administered by personnel who are interested/willing to provide assistance in understanding the program.

Four jurisdictions were selected. For each jurisdiction, Table 1 gives the type of sound level limit enforced and the approximate number of available noise complaint files. The four jurisdictions were selected so that each enforced a different type of sound level limit, thus maximizing the likelihood that a broad range of property line enforcement experiences would be examined.

TABLE 1. JURISDICTIONS WITH PROPERTY LINE NOISE CONTROL PROGRAMS SELECTED FOR STUDY.

Jurisdiction	Type of Property Line Sound Level Limit	Approximate Number of Noise Complaint Files
Bloomington, MN	A-weighted sound level exceeded for 10% of 1 hr	180
Hillsborough Co., FL	Maximum A-weighted sound level	160
St. Louis Co., MO	A-weighted sound level *vs* duration	150
San Diego, CA	1-hr average sound level (equivalent sound level)	700

Each jurisdiction provided three types of information:

- Copies of relevant laws and procedures
- A general discussion of the program including its history, enforcement techniques, and perceived strengths and weaknesses
- Summaries of noise complaint file data.

Appendix A is a copy of a typical request for such information.

3. RESULTS

A property line noise control program is basically a series of components or step-by-step procedures that are designed to respond to citizen complaints about noise. The series of components can have only three outcomes.

- The noise source that produced the complaint is found to be in compliance with the applicable noise control laws
- The noise source that produced the complaint is found to be in violation of the applicable noise control laws *and*
  - It is brought into compliance
  - It is issued a variance.

To serve a community correctly, a property line program must be designed to insure that one of these three outcomes is always achieved for any noise complaint.

To insure that one of the three outcomes results, the agency responsible for the program must have a clear, logically constructed set of procedures. The program is, after all, based on legal responsibilities. The agency must be in a position to show, if required, not only that it has conformed to all legal requirements, but that the noise source is (or is not) operating in compliance with the law. Thus, to achieve one of the three outcomes, the agency must follow detailed procedures, and these procedures must be carefully documented. The agency must keep a complete record of its actions in responding to each complaint.

The following paragraphs first discuss the procedures (the basic components) necessary for a property line noise control program. These basic components were derived from examination of the information provided by the four selected jurisdictions.* In addition, for each program component, the administering/enforcement agency must keep a record of its actions. Thus, the information collection needs are also discussed.

Finally, a method for assessing program effectiveness is presented. In essence, if the responsible agency has kept complete, accurate records of its actions, analysis of these records will suggest ways in which the program might be altered to improve its effectiveness.

3.1 Basic Program Components

Any property line noise control program should have specific procedures that will lead inexorably to one of the three necessary outcomes for each noise complaint. These procedures can be broken into a five-step process:

- Receive complaint
- Verify violation
- Mediate
- Arbitrate
- Take court action.

Each component is associated with specific agency actions and with specific information collection or record-keeping requirements.

---

*Appendix B presents in detail the information provided by the jurisdictions.

The following paragraphs discuss these required *actions* and *records*.

3.1.1 Receive complaint

Actions

The phone call by the complainant initiates the action. The action taken is to convey to the complainant the feeling that his/her problem will be solved, and to begin the recording of complaint response information.

It is important that the complainant recognize that agency personnel are ready and willing to help. Thus, personnel who answer the noise complaint phone lines must know what actions to take, or know to whom the caller should be transferred. It is probably best, however, that the caller not be transferred from phone to phone, but rather that the agency personnel who answer the phone are also the ones who record the necessary noise complaint information and thus initiate agency action.

The noise complaint phone lines should probably be answered on a 24 hr-per-day basis. Noise-induced annoyance is frequently most severe during evening/nighttime/early morning hours, and the agency will be more responsive to citizen needs if a complainant can call at any time of day or night.

What types of noise sources do people complain about? Table 2 summarizes the types of noise sources identified in the noise complaint files of the four jurisdictions. The table also gives a two-letter abbreviation or code for each noise source. These codes will be useful for later assessment of program

TABLE 2. NOISE SOURCE TYPES THAT HAVE PRODUCED COMPLAINTS.

Noise Source Type	Code
Air Conditioner	
Central	AC
Commercial	AM
Window	AW
Aircraft	AF
Flight	AT
Maintenance	AX
Agricultural	
Equipment (stationary – fans, pumps)	AE
Operations	AO
Barking Dog(s)	BK
Birds (in kennels)	BD
Blasting	BL
Car Wash	CW
Chanting	CH
Church Bells	CL
Construction	
Street	CS
Building	CB
Domestic Disturbance	DD
Drums	DR
Home Power Equipment (use/repair)	HE
Industrial	
Equipment (fans, motors, compressors)	IE
Operations	IO
Loading/Unloading Dock Activities	LU
Motorcycle	MY
Motorcycle Repair	MR
Music	
Commercial	MC
Residential	MH
Other	OT
Pool Pump	PP
Power Wood Tools	PT
Public Address System	PA
Race Track	RT
Recreational Vehicle (bikes, motorboats, ATVs)	RV
Refrigeration (commercial)	RU
Refuse Pickup	RF
Rooster	RO
Sirens	SI
Skateboard	SK
Street Traffic	ST
Trains	TR
Trucks – Idle	TI

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effectiveness. They permit a jurisdiction to summarize efficiently its complaint response efforts according to noise source type and to use, if desired, computerized sorting methods.

Tables 3 and 4 provide more detailed information about the noise source types that have resulted in complaint file data. Table 3 shows, for each jurisdiction, the seven noise source types that produced the greatest number of complaints; while Table 4 presents the top five complaint-producing noise source types for all jurisdictions combined. Note that, for the selected jurisdictions, since some agencies respond to complaints about barking dogs and some do not, barking dog complaints have been excluded from the data used to derive Tables 3 and 4.

Records

Information collected and recorded at this step should include:

1. Date/time of complaint
2. Name, address, phone number of complainant
3. Description of the noise source
4. Time of day when noise source bothers complainant
5. How often noise source bothers complainant — times per day, per week
6. Address where noise source is believed to be located
7. Whether and when complainant has complained previously about this noise source.

TABLE 3. PRIMARY NOISE SOURCE TYPES THAT RESULTED IN COMPLAINTS, BY JURISDICTION.

Bloomington, MN		Hillsborough Co., FL		St. Louis Co., MO		San Diego, CA	
Noise Source	Percent*	Noise Source	Percent*	Noise Source	Percent*	Noise Source	Percent*
Refuse Pickup	19	Industrial Equipment	15	Refuse Pickup	21	Residential Music	56
Street Traffic	12	Commercial Music	10	Industrial Equipment	17	Commercial Music	12
Industrial Operations	10	Public Address System	7	Central Air Conditioner	7	Motorcycle Repair	7
Industrial Equipment	9	Residential Music	6	Industrial Operations	7	Motorcycle	7
Home Power Equipment	8	Industrial Operations	6	Loading Dock Activities	7	Building Construction	5
Central Air Conditioner	7	Recreational Vehicles	6	Commercial Air Conditioner	4	Loading Dock Activities	3
Street Construction	6	Agricultural Equipment	5	Building Construction	4	Commercial Refrigeration	3

*Percent of all complaint files, excluding complaints about barking dogs.

TABLE 4. FIVE NOISE SOURCE TYPES (EXCLUDING BARKING DOGS) THAT RESULTED IN THE LARGEST NUMBER OF COMPLAINT FILES, BASED ON COMPLAINT FILE DATA FROM ALL FOUR JURISDICTIONS.

Noise Source	Percent*
Amplified Music/Voice	15
Early Refuse Pickup	15
Air Conditioners	10
Street Traffic	5
Home Power Equipment	5

*Percent of all complaint files, excluding complaints about barking dogs.

The administering/enforcement agency should devise a form for recording this information. Once filled out, the form becomes a part of the noise complaint file and provides the information necessary for further agency action.

3.1.2 Verify violation

Actions

After receiving a complaint and recording the relevant information, the agency must determine whether or not the alleged source of noise is, in fact, the source of noise and must verify that the source is operating in violation of the noise control laws. Positive verification requires that agency personnel conduct a site visit and, probably, that they make noise measurements. Such visits can be the most expensive (time-consuming) component of property line noise control programs, and agencies may wish to devise procedures that minimize or optimize the total number of visits that personnel make.

One method for optimizing the number of visits is to make the first agency response a phone or a mail response. The agency could, for example, inform the owner/operator of the alleged source of noise of the possible violation of the noise control law, ascertain whether the person agrees that there may be a noise problem, determine whether the person is likely to take remedial action, and finally inform the person that a further complaint will result in a site visit by agency personnel, etc. Often, the owner/operator of a noise source knows that it is noisy and has "been meaning to get it fixed." A single letter or phone call by agency personnel may be the necessary stimulus. The phone call record or a copy of the letter sent should be added to the noise complaint file.

If a site visit is required, the actions taken to verify that a violation exists will vary depending upon the type of noise source causing the complaint and upon the noise law. Noise sources that generate complaints can be categorized in one of three ways:

Category 1 — Sources to which the noise law applies and to which the sound level limits of the law are easily applied.

Most types of equipment, many industrial and commercial operations, and most electronically amplified sources fall into Category 1. These are air conditioners, fans, pumps, refrigeration units, loading dock activities, car wash equipment, music from commercial establishments, public address systems, home power equipment, home stereo systems, and other similar nonimpulse/nonimpact sources. Generally, regardless of the type of sound level limit used in the law, these sources can be measured to determine whether or not a violation exists. Agency actions involve making measurements in accordance with specified procedures at specified location(s) (usually the property line) and collecting appropriate data.

One particular Category 1 noise source deserves special consideration: refuse collection. It is possible that 15% to 20% of all complaints received each year will be about early morning refuse collection (see Tables 3 and 4). Verifying a violation of sound level limits may, for this activity, be difficult because of infrequent occurrence, and because it occurs outside of normal working hours. The most efficient method for dealing with this problem may be simply to place a curfew on trash collection. Then verification may not be required. A complaint implies violation, and a letter or phone call to the refuse collection company/agency may solve the problem.

Category 2 — Sources to which the noise law applies, but to which the limits cannot be easily applied.

Category 2 noise sources are generally those that produce short duration, high levels. Blasting, explosions, gun shots, and even barking dogs are in this category. These are the sources whose ability to bother people has not been firmly related to physical measures of the noise they produce, and whose characteristics of operation make them difficult to measure.

Of these sources, however, only the barking dog is likely to be present and produce complaints in most jurisdictions. In fact, complaints about barking dogs may represent anywhere from 30% to 85% of all complaints received each year. Thus, any property line program must either have a prepared set of actions for responding to barking dog complaints, or barking dogs should be exempt or handled as a nuisance by some other agency such as the Police Department or the City Pound.

The noise control program actions can treat barking dogs as a nuisance or can attempt to establish a quantitive measure (e.g., barks per hour, maximum sound level produced) that determines violation. Of the four jurisdictions studied, two exempt barking dogs, and two deal with them as a nuisance problem. In dealing with them as a nuisance, they cannot really be verified as violating the law. Rather, the owner must be requested to correct the situation in the hope that he/she will do so simply out of a general respect for the law, or because of a desire to be a good neighbor. If the owner cannot/will not silence the dog, and the case eventually requires court action, the hope is that there will be sufficient evidence collected in the complaint file to demonstrate reasonably that the barking dog is a nuisance.

Category 3 – Sources that are specifically exempted from the law.

These are the sources that are often exempt from municipal property line noise control programs: aircraft in flight, motor vehicles on public rights-of-way, emergency vehicles, some or all construction activities, railroad operations, and emergency warning devices.

Records

Data collected will vary depending upon noise source category, but generally should include:

1. Date/time of sound level measurement
2. Location of measurement
3. Distance from measurement location to source
4. Distance from complainant's residence to source
5. Approximate number of residences/dwelling units exposed to sound levels equal to those at the complainant's dwelling

6. Measured sound levels
    a) with source operating
    b) without source operating
7. Sketch showing measurement location(s), residences, and noise source
8. Applicable sound level limit specified by law.

For Category 1 noise sources, violation of applicable sound level limits will be easily determined. On the other hand, if the noise produced by the source is not easily measured, an attempt should be made to make measurements anyway and to note the difficulties. By so doing, the agency will maintain records on all noise source categories and, during periodic assessments, be able to judge whether enforcement procedures, or even the noise control law itself, should be revised (see Sec. 3.2).

3.1.3 Mediate

Actions

This is the first of the three program components that will get the difficult noise problems resolved. The other two (Arbitrate, Take Court Action) are progressively more formal and more complete applications of the agency's legal power to solve noise problems. This component is the first, mild application of legal power when persuasion without formal legal action is used to encourage compliance.

The agency actions include notifying the owner/operator of the noise source that the source is being operated in violation of the law, and providing information about what the law requires if conformance is to be achieved. Notification should be with a form or letter specifying at least:

- The section or sections of the law that are violated
- When violation occurred
- The time period allowed for bringing the source into compliance
- Appeal/variance procedures
- Which government agency (personnel?) to contact for further information about the violation
- The next action that must be taken by the owner/operator and the resultant agency response if the owner/operator fails to act.

The agency must have formal procedures and time schedules for notification and follow-up. No loose ends or loop holes in the procedures can exist. Construction of a flowchart, similar to Fig. 1 for example, may help insure that all loops are closed. Figure 1 shows only a portion of the program procedures that might be developed. It includes not only specific agency actions, but also time schedule and record-keeping requirements.

In addition to communicating with the owner/operator of the noise source, the agency must maintain communication with the complainant. The complainant must be reassured that the problem is being solved, and that his/her complaint has not disappeared into the governmental bureaucracy.

Most importantly, if the enforcement agency believes the problem has been solved, the complainant must be notified and

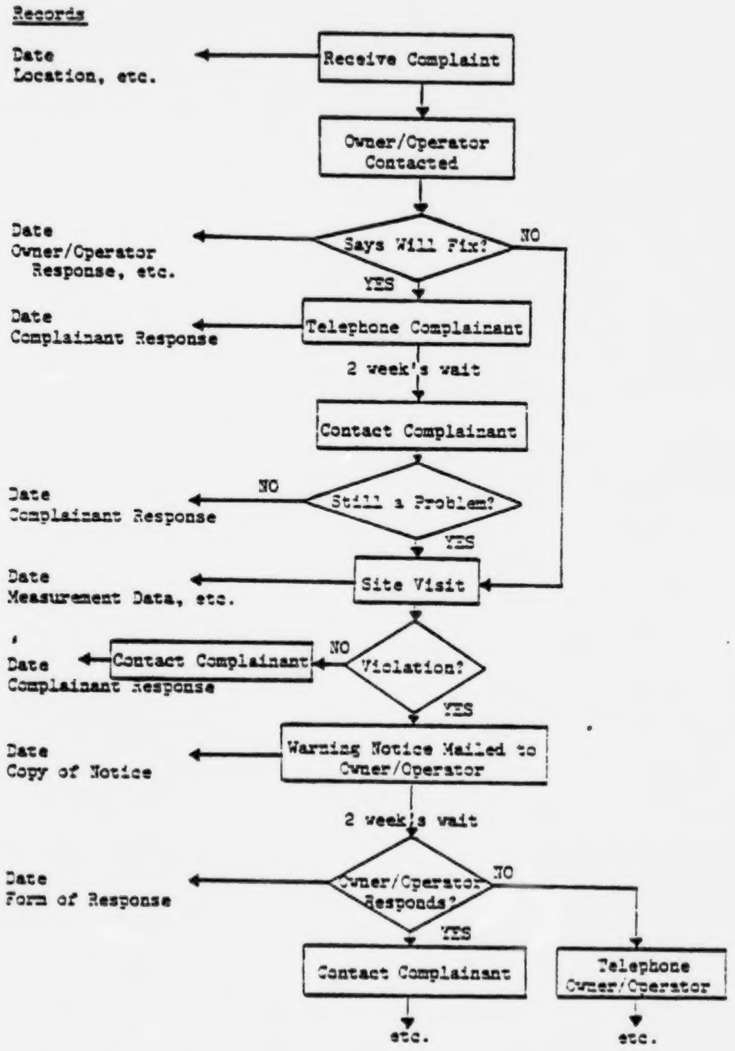

Records
Date
Location, etc.
Receive Complaint
Owner/Operator Contacted
Date
Owner/Operator
Response, etc.
Says Will Fix?
NO
YES
Date
Complainant Response
Telephone Complainant
2 week's wait
Contact Complainant
Date
Complainant Response
NO
Still a Problem?
YES
Date
Measurement Data, etc.
Site Visit
Date
Complainant Response
Contact Complainant
NO
Violation?
YES
Date
Copy of Notice
Warning Notice Mailed to Owner/Operator
2 week's wait
Date
Form of Response
Owner/Operator Responds?
NO
YES
Contact Complainant
Telephone Owner/Operator
etc.
etc.

FIG. 1. TYPICAL FLOWCHART FOR PORTION OF PROPERTY LINE NOISE CONTROL PROGRAM PROCEDURES.

given the opportunity, in fact encouraged, to notify the agency if he/she feels the problem has not been solved or if it recurs. The goal of the program, after all, is to eliminate the cause of the complaint. Only the complainant can really determine whether that goal is accomplished.

Records

1. Number of times noise source owner/operator is visited, phoned, written, or person-hours spent dealing with owner/operator
2. Number of times complainant is contacted, person-hours spent dealing with complainant
3. When problem is solved:
    a) Noise measurement data taken after source is corrected (similar to *Records*, Sec. 3.1.2)
    b) Date compliance achieved
    c) Date of final contact with complainant
    d) Brief description of modification, repairs, etc., made to the noise source to achieve compliance.

3.1.4 Arbitrate

Actions

This component, like the preceding one of mediation, is designed to resolve noise problems efficiently, but with more formal use of the agency's authority. Action is initiated if mediation fails to achieve compliance. The action required is to hold a meeting/hearing with the owner/operator of the violating source, complaining witness(es), inspector, and other interested parties to explain their views of the problem. An agency official would moderate. The intent of the step is not only to put more pressure on the owner/operator to comply, but to build the record and to identify any significant or unusual circumstances that are preventing or hindering remedial action.

This component may be most appropriate for property line programs that are large enough to have several noise investigators — programs where no single official can possibly stay fully informed about the progress of all complaint response actions. This component offers, in other words, an opportunity to involve a higher level of authority for particularly difficult noise problems. Such a step is a means of insuring efficiency by guaranteeing that only the most troublesome problems get highest level agency attention.

After the meeting/hearing, the agency should make some formal determination of action to be taken. Should the owner/operator submit a detailed plan for noise abatement that includes a specific time schedule? Is a variance required? How much time does the owner/operator have to comply before the agency will initiate court action? Naturally, the owner/operator will be able to appeal any such rulings.

Records

1. Date of meeting/hearing
2. Persons attending
3. Statement of facts presented
4. Statement of agency rulings
5. Same type of information collected for Mediation, as applicable.

3.1.5 Take court action

When the preceding steps fail to resolve the noise problem that caused the complaint, prosecution in court is necessary. To the extent that accurate, complete records have been maintained, this action should be that much easier and less time-consuming for agency personnel and prosecuting attorneys.

3.1.6 Summary of information recorded

Table 5 summarizes for each step of the complaint response process the information that should typically be collected for the records. The information is quite extensive, and its collection will be time consuming. Once collected, however, the information will permit a jurisdiction to examine past efforts to determine their effectiveness. All the information will not, of course, be collected on a single form. A series of forms that are appropriate for each step of the process could be designed. For example, a single form could be designed for use by the personnel who answer the noise complaint phone lines. Another form would be used for site visits/field measurements. Standard telephone logs might be used for follow-up phone calls.

3.2 Method for Assessment of Program Effectiveness

How well does the property line noise control program achieve its goal of minimizing noise impact in the community? Appendix C presents a detailed discussion of alternative methods for assessing the community-wide benefits (reduction of impacts) provided by noise control programs. It examines strengths and weaknesses of using the number of noise complaints, noise measurement data, and social survey data. Though social survey data probably provide the most reliable assessment of benefits, they are time-consuming and expensive to obtain for a specific community.

TABLE 5. SUMMARY OF INFORMATION RECORDED AT EACH STEP OF THE COMPLAINT RESPONSE PROCESS.

Complaint Response Step	Typical Information to be Collected for Records
I. Receive Complaint	A. Date/time complaint received
	B. Name, address, phone number of complainant
	C. Description of noise source
	D. Time of day when noise source bothers complainant
	E. How often noise source bothers complainant — times per day, per week
	F. Address where noise source is believed to be located
	G. Whether and when complainant has complained previously about this noise source
	H. Name or initials of official taking complaint
II. Verify Violation	A. If agency contacts noise source owner/operator by phone:
	1. Date/time contacted
	2. Owner/operator's response to complaint ("Noise source will be quieted," "Couldn't be me," etc.)
	3. Date/time complainant notified of owner/operator's response
	4. Date set for contacting complainant to ensure noise problem is resolved
	5. Person-hours spent contacting owner/operator and complainant
	6. When complaint is resolved:
	a. Date complaint resolved/complainant contacted
	b. Description of modifications, repairs, etc., made to the noise source
	c. Cost to owner/operator to achieve compliance
	B. If site visit/sound level measurement is necessary:
	1. Date/time arrive at site
	2. Location of sound level measurement — sketch
	3. Distance from measurement location to source
	4. Distance from complainant's residence to source
	5. Approximate number of residences/dwelling units exposed to sound levels equal to those at the complainant's dwelling
	6. Sound level measurement information
	a. Equipment used and respective serial numbers
	b. Time of initial and final equipment calibrations
	c. Measured sound levels with source operating
	d. Measured sound levels without source operating
	7. Applicable sound level limit specified by law
	8. Note any special measurement problems encountered
	9. Time depart site
	10. Person-hours spent on site visit

TABLE 5 *(Cont.)*. SUMMARY OF INFORMATION RECORDED AT EACH STEP OF THE COMPLAINT RESPONSE PROCESS.

Complaint Response Step	Typical Information to be Collected for Records
III. Mediate	A. Initial notification: 1. Date "notification of violation" mailed/delivered to owner/operator of noise source (keep a copy of notification on file) 2. Date set for first follow-up contact with owner/operator 3. Date/time complainant informed of progress 4. Person-hours spent preparing notification and informing complainant
	B. For each follow-up contact with owner/operator: 1. Date/time of contact 2. Owner/operator actions taken in response to notification of violation 3. Date set for next action of a. Sound level measurement to determine compliance b. Owner/operator application for variance c. Formal arbitration meeting/hearing 4. Date/time complainant informed of progress 5. Person-hours spent contacting owner/operator complainant
	C. For each sound level measurement made: 1. Date/time arrive at site 2. Location of sound level measurement — sketch 3. Sound level measurement information a. Equipment and respective serial numbers b. Time of initial and final equipment calibrations c. Measured sound levels with source operating d. Measured sound levels without source operating 4. Time depart site 5. Date/time complainant informed of progress 6. Person-hours spent on site visit and informing complainant
	D. When compliance is achieved: 1. Date compliance achieved 2. Description of modifications, repairs, etc., made to the noise source to achieve compliance 3. Cost to owner/operator to achieve compliance
	E. If a variance is requested, the information recorded will depend upon local variance procedures but will probably include : 1. Copy of request for variance 2. Statement of administrator's/board's rulings including conditions that must be met by owner/operator and an appropriate time schedule for achieving compliance
IV. Arbitrate	A. For arbitration meeting/hearing: 1. Date/time 2. Persons attending 3. Statement of facts presented 4. Statement of agency rulings
	B. Additional information recorded will depend upon agency rulings, but will probably be similar to information collected in II B, C, and D.

Noise measurement data, on the other hand, are more easily acquired, and if related to available "universal" social survey data and to numbers of people in the community exposed to the measured noise levels, can be used to estimate benefit. Non-noise benefits, for example, benefits that result because a noise control program has begun and people simply believe conditions are improving, cannot be estimated using noise measurement data.

Numbers of complaints are the least reliable estimator of program benefits. The number of complaints received is too sensitive to non-noise issues: socioeconomic status of potential complainant, accessibility of government, likelihood of response, utility of the noise source.

Examination of the data supplied by the four jurisdictions suggests that any reliable assessment of benefits requires detailed, consistantly collected complaint response information. Such consistantly collected, comparable data were not available in large enough quantity to develop a reliable benefit assessment of the enforcement strategies of the different communities. Rather, analysis of the data suggested that:

- A routine complaint response data collection procedure can be developed
- Data collected with such a procedure could be used by an agency for assessing program effectiveness, that is, for assessing how well the program responds to and resolves noise-generated problems
- Data collected with such a procedure by several different jurisdictions is needed to assess the relative benefits of different noise control strategies in accordance with the method described in Appendix C.

Section 3.1 presented the basic complaint response data collection procedure. It discussed what data or what information should be recorded in the complaint file during each step of agency complaint response. Section 3.2 now discusses how an administering/enforcement agency can use the data to assess how well it is resolving noise-generated problems. The broader problem of assessing the relative benefits of different noise control strategies is discussed in Appendix C.

Once an agency has begun collecting complaint response information, the agency should periodically review the records to track the program's progress. The following paragraphs examine the information collected at each step of the complaint response procedures and suggest how that information will help an agency assess its noise control program.

3.2.1 Receive complaint

Information about location of complainant, type/location of the noise source, and operating characteristics of the noise source is collected (Sec. 3.1.1).

Location of Complainant

The agency can determine for each type of noise source if many or most complaints originate in a specific area of the jurisdiction, or if the complaints are spread throughout. If complaints arise in a specific small area, a land use compatibility problem may exist. The assembled information may suggest that zoning changes should be considered, or that a major noise control effort, such as noise barrier construction, is justified.

Type/Location of Noise Source

Recurring complaints about a specific noise source will be identified. Does one particular noise source frequently generate complaints? Was the source of noise not properly controlled in response to earlier complaints? Has the owner/operator of a noise source failed to implement adequate corrective action? For example, recurring complaints about refuse collection may suggest that the company/agency that collects refuse has not developed a suitable routine for informing new drivers/dispatchers about curfews.

Are a few types of noise sources responsible for a large percentage of the complaints? If so, might there be some method to prevent the situations that cause the complaints? For example, suppose central air-conditioning units that are installed between houses cause many complaints. Could the jurisdiction, through its building permit procedures, impose noise control-related restrictions on installation of such units in side yards?

Do noise sources that are exempt from the requirements of the law frequently generate complaints? Under what circumstances do they generate complaints? Perhaps some sources should not be exempt, or they could be subject to special provisions that recognize their special status (e.g., emergency vehicles), but that still minimize the number of people exposed to their noise or the level of their noise.

Noise Source Operating Characteristics

Do some types of noise sources cause complaints only if operated during the night? Consequently, might limitations on operation (e.g., curfews) be a satisfactory noise control method?

* * *

In general, the agency that responds to noise-generated complaints is at the focus of the community's noise problem. Well-kept records, analyzed periodically, will help identify long-range solutions to these problems. Responding efficiently to noise complaints is certainly the primary goal of the agency. But this is a short-term goal. By examining the collected information for trends, long-term solutions can be developed — solutions that prevent the problems from occurring, rather than solutions that try to address problems after they have occurred.

3.2.2 Verify violation

The collected information includes noise measurement data and the number of people exposed to the noise of the source.

Noise Measurement Data

For each type of noise source, the data will show what noise levels the complainant experiences. Do the measured levels exceed the sound level limits of the law? If some sources frequently produce levels that are not in violation of the law, then possibly the limits in the law do not offer adequate protection to the community and should be revised.

Which noise sources are difficult to measure and why? That is, which noise sources fall into Category 2 of Sec. 3.1.2? Would a different type of sound level limit be easier to apply? Or, is it necessary to deal with some noise sources on a nuisance, nonquantitative basis only?

Number of People Exposed

For each type of noise source, does a single complainant really represent a large number of people who are exposed to equally high noise levels, or does a complainant generally represent only a single household? Such information is valuable for assessing total community benefit provided by the program. Agencies should know if the time spent responding to complaints results in lowered noise levels for only the complainant, or for a larger section of the neighborhood/community.

3.2.3 Mediate

These records show how much agency effort was required to resolve each type of noise problem. The noise control program should be designed to achieve compliance with minimum expenditure of effort. Properly maintained records will permit the agency to judge, by type of noise source, how personnel spent their time in attempting to gain compliance, and whether there might be more efficient ways to respond to complaints.

For example, if any single type of noise source requires unusually large numbers of person-hours to achieve compliance, the agency may wish to find out if there is any identifiable reason for this expenditure of time. Is the noise source technically difficult to quiet, and could the experience gained in quieting one source be used in quieting another? Are there administrative changes that might be made to reduce time spent, such as relying more on phone calls and less on site visits to respond to complaints. Comparison of time spent for each flowchart step should help identify more efficient procedures.

These records may also be used to judge, from year to year, changes in program efficiency, and these changes could demonstrate the need for more personnel. For example, total time between date of first complaint and date of compliance might increase significantly from year to year, while total person-hours spent on each complaint could remain the same or decrease. The conclusion could be that too many complaints are being received for the number of personnel available to respond. The records, in other words, could permit a quantitative analysis of the effects of increased complaints or of additional noncomplaint response duties for program personnel. A typical conclusion might be: "Because of increased noise complaint response work load and no increase in personnel, it takes an average of two months, rather than one month, to resolve the complaints." Or, "Due to additional nonenforcement duties that noise inspectors must perform, 90% of the complainants must wait twice as long for their noise problems to be resolved."

Once the noise source is brought into compliance, noise measurements must again be made to verify compliance. These measurements, for each type of source, will permit an estimation of resulting community benefit. The noise reductions are known, and the number of people exposed to the noise levels are known. Using the procedures of Appendix C, the agency can estimate resulting benefits.

3.2.4 Arbitrate

The records will not only show the additional agency effort required by the meeting/hearing, but also will continue to build the information that will be needed if the noise problem must be resolved in court. The record will help demonstrate owner/operator willingness, or lack thereof, to comply and will document any significant problems impeding compliance.

Agencies will know, from record analysis, how many complaints cannot be resolved without arbitration. Is arbitration usually required for any specific noise sources? Is arbitration necessary because the source is so difficult to quiet, or because owner/operators are unwilling to take remedial action?

3.2.5 Take court action

Clearly, court action will benefit greatly from thorough record collection. Evidence of agency efforts, owner/operator unwillingness to comply, etc., will be available for use by prosecuting attorneys.

4. RECOMMENDATIONS FOR FURTHER WORK

Though each jurisdiction that already has, or that is developing, a property line noise control program could develop its own record-keeping forms and procedures, a national-level "clearinghouse" could provide an economical means for form development and data analysis. For example, as suggested earlier, if all jurisdictions used similar record-keeping forms and similar codings (such as those of Table 2), data from different jurisdictions could be directly compared. Further, if record-keeping procedures and codings were identical for all jurisdictions, a single computer program could be used to sort/analyze the information from any program.

Each jurisdiction would, of course, have to participate, or at least review, any data collection/coding procedures. Each program has its own special record-keeping needs. However, a universal format could be developed. For example, all noise sources identified by the complaint files of the four selected jurisdictions can be described with the codes of Table 2. Similarly, all outcomes of noise complaint investigations can be described using the codes of Table 6.

After universal codings are developed, pertinent data from each complaint file can be coded into a format that may be analyzed (sorted) by computer. The format could be devised so that, for example, the information from each file will fit on a single IBM card. Table 7 and Fig. 2 show one coding format that could be used. Appendix D presents copies of coding forms completed using this format for Bloomington, MN complaint files.

TABLE 6. DESCRIPTION OF THE FINAL OUTCOMES (REMEDIES) OF NOISE COMPLAINT INVESTIGATIONS.

Description of Remedy	Code
Animal trained - general	TR
- with collar	TC
- with muzzle	TM
Auto muffler	MF
Barrier constructed	BR
Curfew imposed - restrict duration per hour	CH
- restrict duration per day	CD
- restrict duration per week	CW
Dog debarked	DK
Discontinued - unknown reasons	DC
- for non-noise reasons	DN
- for noise reasons	DR
Enclosure constructed	EN
Animal "put to sleep"	EU
Misidentification (of source)	MI
Dog muzzled	MZ
No action to correct taken	NA
Not covered/exempt from law	NC
No violation — per noise limits	NV
Noise source operation modified	OP
Offender moved	MV
Reduced volume of amplification	RV
Relocated on property	RL
Removal	RM
Retrofit (includes maintenance)	RT
Source of noise not determined	SN
Subjective judgment — "Judged not to be a problem"	SJ
Unsolved	UN
Unsubstantiated remedy ("Will be quieted," "Won't happen again")	UR

TABLE 7. COMPLAINT FILE CODING FORMAT.

Item No.*	Description	Entry[†]
1.	File number - AA = BL, HL, SL, SD**	AAIIII
2.	Date of first complaint, month day year	IIIIII
3.	Last entry date/date of compliance (no compliance=000000)	IIIIII
4.	Resultant duration in days	III
5.	No. of contacts/meetings/investigations	III
6.	"Official Notice to Correct" given (HL)/ "Correction of Conditions" issued (BL)	Y or N
7.	"Letter sent" (HL)	Y or N
8.	Citation given	Y or N
9.	Citation appealed	Y or N
10.	Flow chart stage required for compliance (SD)	I
11.	Noise source — see codes of Table 2	AA
12.	Complainant bothered: Day Evening Night	Y/N Y/N Y/N
13.	Remedy (ies) — see codes of Table 5	AA/AA
14.	Number of complainants	III
15.	Number of dwelling units affected	III
16.	Measured sound level — w/source before corrected	II
17.	Level is: Max (MA); L_x (II); L_{eq} (LE)	aa
18.	Duration (min/min)	II/II
19.	Distance (ft)	IIII
20.	Source is: steady state (SS) steady state with duty cycle (SD) fluctuating (FL) impulse (IM)	AA
21.	Measured sound level — w/source, after corrected	II
22.	Duration (min/min)	II/II
23.	Distance (ft)	IIII
24.	Measured sound level — w/o source	II
25.	Source operated 1 - continuously 2 - many times each day 3 - a few times each day 4 - once each day 5 - every other day 6 - once or twice a week 7 - less than once a week	I
26.	Case initiated by council action (SD)	Y or N

*Item number refers to the item numbers on the coding form of Fig. 2.

[†]Letters given in this column tell what the entry on the coding form should be:

A = entry should be a letter
I = entry should be an integer
a = entry is a letter or an integer
Y/N = entry should be a Y for "yes," an N for "no."

For items not applicable to a given jurisdiction, enter "*". For items that are applicable, but which jurisdiction has not supplied, enter "0".

**File number is two letters and four integers. The first two letters tell which jurisdiction the complaint file data comes from:

BL = Bloomington, MN
HL = Hillsborough Co., FL
SL = St. Louis Co., MO
SD = San Diego, CA.

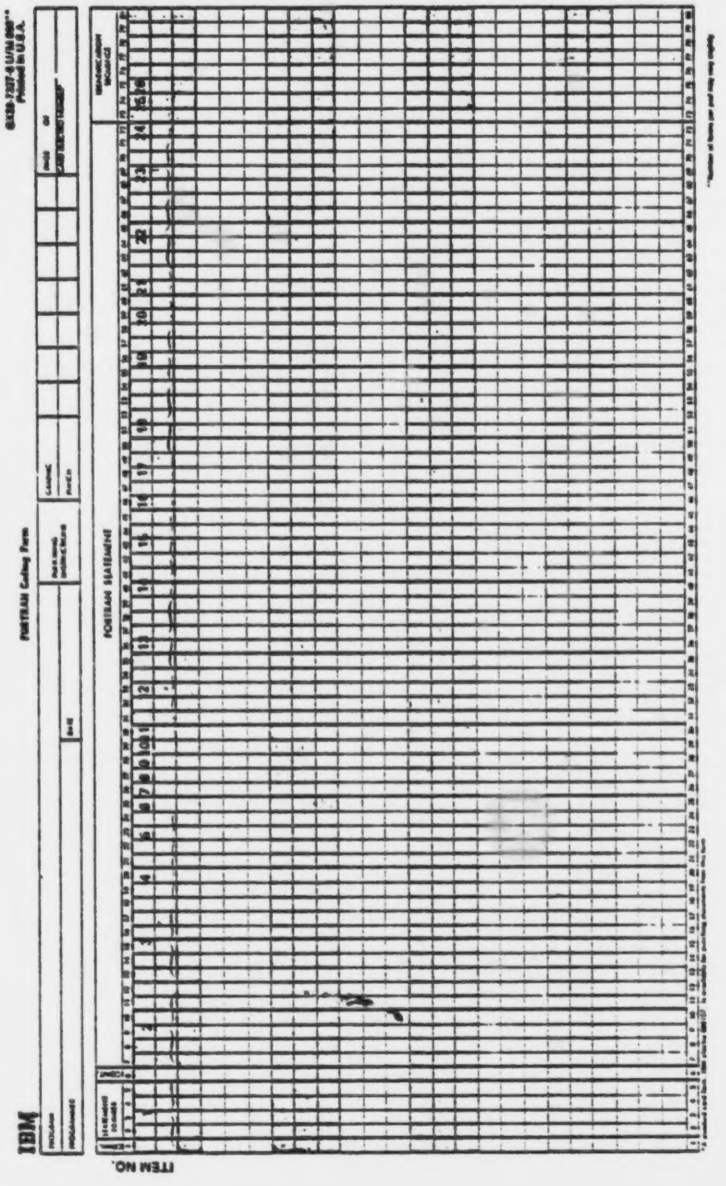

IBM
FORTRAN Coding Form
FORTRAN STATEMENT
ITEM NO.

FIG. 2. SAMPLE CODING FORM SHOWING COLUMNS USED FOR EACH ITEM NUMBER OF TABLE 7.

The recommended course of action can be summarized as follows. At the national level, with the assistance/cooperation of jurisdictions currently enforcing or developing property line noise control programs:

- Develop universal complaint file data collection forms
- For data gathered on the forms, develop
    - A coding format
    - Computer software capable of sorting the data by various agreed-upon parameters
- After complaint data has been collected for a selected time period (probably at least one year), code data and submit for computer sorting.

The computer program should probably be of the "interactive" variety so that different types of sorting could be tried. Considerable effort should be devoted to trying and analyzing different data sortings. If a computer network, accessible by phone line, were used, each jurisdiction could access the central data files and perform its own sorting/analysis of complaint file data.

APPENDIX A: INFORMATION PROVIDED BY JURISDICTIONS

A. Copies of Laws and Procedures

1. Copies of laws (statutes, ordinances, by-laws, administrative regulations) that apply to control of noise through the use of property line sound level limits. These are the laws that give an agency authority to control noise, tell who is subject to the noise prohibitions/limitations, and give the specific prohibitions/limitations.
2. Copies of training manuals and/or materials used to instruct personnel in the enforcement of Hillsborough County's noise rules.
3. Copies of any forms used for administration or enforcement of the noise rules.

B. Summary Report Discussing:

1. How property line sound level limits are enforced. After receiving a noise complaint, what are the procedures followed? When and how are noise measurements made? When and how often is an Official Notice given? What followup is used to ensure that violations are corrected?
2. Earlier forms of noise laws tried and rejected and why. How was Hillsborough County's previous nuisance noise law enforced, and what were the problems with this earlier law? If possible, give an example.

3. Events responsible for development/adoption of the present law. Were there specific noise problems that made noise an issue and consequently brought about the current law?

4. Types of instrumentation tried and either rejected or found particularly useful. What equipment do you use now, and how is it used? Provide, if possible, copies of manufacturer's brochures.

5. Any specific noise problems that are not handled by the Hillsborough County Commission such as barking dogs, noisy parties? What agency, if any, does handle these problems?

6. What difficulties, if any, have you found in enforcing the maximum permissible sound levels? Discuss the problems you have had with Golden Gate and East Bay Raceway. By how much did race activities exceed the maximum permissible sound levels? What solutions, including use of variance, have been used in an attempt to bring the race track into compliance?

7. Any noise problems the agency has dealt with, or is dealing with, that affect a large number of people. These are the problems that, when resolved, will benefit many people. It will be satisfactory to use Sec. C in this appendix as a format for providing this information, but additional information will be required to determine the number of people benefited by the solution to the problem, such as a map showing the measured sound levels at various distant community locations, both with and without the source operating.

8. Program Costs. For example, give number of people who spend some or all of their time on enforcement/ administration of property line sound level limits, percent of time spent by these people, and job classification. Give also annual budget directed to the program in terms of line items such as salaries, support, capital expenditures, overhead, etc.

9. Other noise-related services performed by the Commission. Do you ever assist in land use planning? For example, do you ever review proposed projects, such as race tracks or industrial developments? Do you make recommendations, and must these recommendations be adhered to?

C. Information from Property Line Noise Complaint Files
Complaint No. ________________

1. Date of first complaint ______________________________

2. Location of complainant (mark on county map with Complaint No.)

3. What time of day was complainant bothered?

( ) At night (10 p.m. to 7 a.m.)
( ) Evening (7 p.m. to 10 p.m.)
( ) Daytime (7 a.m. to 7 p.m.)

4. What was the source of noise and the location of the source? (For example: loading dock noise at shopping center; window air conditioner in private house; trash pickup in residential area; cooling towers at high rise apartment building.) ______

____
____
____
____
____

5. Was Official Notice to Correct given? ( ) Yes ( ) No

6. Was citation given? ( ) Yes ( ) No

7. Was citation appealed? ( ) Yes ( ) No

8. Number of times violator was contacted by enforcement personnel (counting visits and meetings).

9. Date investigation closed: ______________________________

10. If not closed, what is present status?

11. What specific action was taken by the responsible party to abate or reduce the noise levels?

12. Number of houses or dwelling units affected (could have been bothered) by the noise ________________.

13. Sound Level Measurement Information

- Source operated:
  - ( ) Continuously
  - ( ) Many times each day
  - ( ) A few times each day
  - ( ) Once each day
  - ( ) Every other day
  - ( ) Once or twice a week
  - ( ) Less than once a week

A. Source Noise Levels *Before* Corrective Action

Date of measurement: ______________________

Time of measurement: ______________________

Measured Maximum Level: ______________ dB(A)

Distance from source: ______________ ft

B. Source Noise Levels *After* Corrective Action

Date of measurement: ______________________

Time of measurement: ______________________

Measured Maximum Level: ______________ dB(A)

Distance from source: ______________ ft

C. Noise Levels *Without* Source Operating

Date of measurement: ______________________

Time of measurement: ______________________

Measured Level: ______________ dB(A)

APPENDIX B: SUMMARY DESCRIPTION OF THE SELECTED PROPERTY LINE NOISE CONTROL PROGRAMS

Condensed from reports provided by:

Lon Loken, Bloomington, MN

Robert Jones and Joyce Morales, Hillsborough County, FL

John Spell, St. Louis County, MO

James Dukes, San Diego, CA.

B.1 Bloomington, Minnesota — Department of Community Health, Environmental Services Section

B.1.1 Description of laws (see also B.1.2)

a. *Article VI. Ordinance Violations* — Confers powers and authority on Director of Community Development (and others) to serve notice on persons charged with ordinance violations.

b. *Article IV. Noise Code* — Establishes sound level limits in terms of A-weighted sound levels exceeded for 10% of 1 hr. Sound levels are measured on noise source property line. Limits depend upon zoning districts and time of day, for example:

Residential - 60 dB(A) daytime (7 a.m. to 10 p.m.)
- 50 dB(A) nighttime

Places restrictions on air-conditioning equipment, snowmobiles, motor vehicles, recreational motor vehicles, outdoor power implements, construction activities, and refuse hauling.

Defines and prohibits nuisance noises.

Includes exception provision and appeal provisions.

c. *Section 107.03. Snowmobile Use* — Prohibits operations.

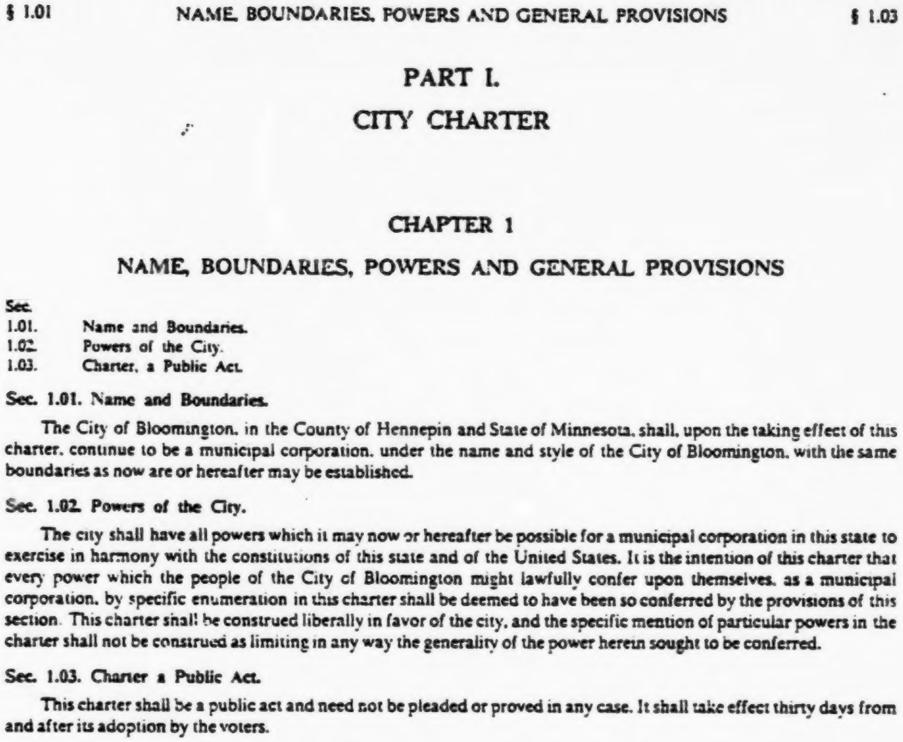
d. *Section 8.64. Recreational Motor Vehicles* — Restricts use; has equipment requirements for muffler, brakes, and lights.

e. *Article V, Sound Trucks* — Registration and use requirements.

f. *Section 19.65. Off-Street Loading* — Restricts time of operation to 7 a.m. to 7 p.m., if noise therefrom is audible in a residential district.

g. *Section 12.08.01. Participation in Noisy Parties or Gatherings* — Prohibits parties or gatherings that create enough noise to disturb the peace.

B.1.2. Copies of laws, Bloomington, MN



PART I.

CITY CHARTER

CHAPTER 1

NAME, BOUNDARIES, POWERS AND GENERAL PROVISIONS

Sec.

1.01. Name and Boundaries.

1.02. Powers of the City.

1.03. Charter, a Public Act.

Sec. 1.01. Name and Boundaries.

The City of Bloomington, in the County of Hennepin and State of Minnesota, shall, upon the taking effect of this charter, continue to be a municipal corporation, under the name and style of the City of Bloomington, with the same boundaries as now are or hereafter may be established.

Sec. 1.02. Powers of the City.

The city shall have all powers which it may now or hereafter be possible for a municipal corporation in this state to exercise in harmony with the constitutions of this state and of the United States. It is the intention of this charter that every power which the people of the City of Bloomington might lawfully confer upon themselves, as a municipal corporation, by specific enumeration in this charter shall be deemed to have been so conferred by the provisions of this section. This charter shall be construed liberally in favor of the city, and the specific mention of particular powers in the charter shall not be construed as limiting in any way the generality of the power herein sought to be conferred.

Sec. 1.03. Charter a Public Act.

This charter shall be a public act and need not be pleaded or proved in any case. It shall take effect thirty days from and after its adoption by the voters.

ARTICLE VI. ORDINANCE VIOLATIONS

Added by Ord. No. 64-69, 9-2-64

Sec. 2.99. Authorization to Issue Tags.

The City Council hereby confers the power and authority to issue and serve a written printed notice, hereinafter referred to as a tag, upon persons charged with ordinance violations, or to post such notice at the place of violation, upon the Animal Warden, the Fire Chief, Fire Marshal, Health Officer, Police Chief, Director of Community Development, and all duly appointed, qualified and acting inspectors, officers and employees of the several departments of the City charged with enforcing the City Code. Such tag shall be served upon the person creating the violation, the owner, lessee, or person in charge of the premises alleged to be in violation; or shall be posted as set forth in this section.
(Code, 1958 § 74.24)

Sec. 2.99.01. Ordinance Violations Bureau.

(a) *Establishment.* The Ordinance Violations Bureau of the City of Bloomington is hereby authorized and established. The Ordinance Violations Bureau shall be conducted and operated in accordance with rules adopted by the Hennepin County Municipal Court in accordance with Chapter 493 Minnesota Statutes (Chapter 251, Laws of 1961) to assist the Court in disposing of violations of ordinances relating to building construction, operation or maintenance, fire and fire prevention; public health and sanitation and zoning, and may from time to time amend such rules.

(b) *Procedure.* The Court shall designate the head of the Bureau and shall name his assistants, if any.

(c) *Location and Hours.* The Bureau shall occupy the space and facilities designated by the Municipal Court subject to the approval of the City Council. The Bureau shall be open each day, except Saturdays, Sundays and holidays, between 8:00 A.M. and 4:30 P.M.

(d) *Records, Fines, and Funds.* The Ordinance Violations Bureau shall keep a record of all cases of violations brought before it, including their final disposition, and also a record of the collection and disposition of all fines. Fines and other moneys collected by the Bureau shall be disposed of in the same manner as if guilt had been determined in Court. The Bureau shall perform such additional duties and keep such additional records and reports as shall be prescribed by the County.

(e) *Disposal of Violations.* Violation of ordinances within the jurisdiction of this Chapter shall be disposed of as provided in Minnesota Statutes, Section 492.04, and acts amendatory thereof relating to traffic violations bureaus. Compliance with the procedure specified in that section shall have the same effect as a judgment of conviction entered upon a plea of guilty in open court, and the violator shall be given a receipt which so states.

(f) *Failure to Appear.* If the person charged with the violation does not appear at the Bureau within the time and in the manner specified by Court rule, the Clerk of Court with the assistance of the Legal Department shall cause a

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complaint to be prepared, which complaint shall be signed by the issuer of the tag and a warrant issued for the arrest of such person and his appearance in Court.

(g) *Court to Establish Rules.* The Court is authorized to make and establish from time to time such rules for the operation of said Bureau as are not inconsistent with Chapter 493 Minnesota Statutes. The Court rule, or any amendment to a rule, shall take effect after adoption and publication at the expense of the City, in the same manner as ordinances are published.

(h) *General Operation.* Rule 41 of the Hennepin County Municipal Court Rules is hereby incorporated by reference as to Subdivision 1 relating to the general provisions of the Ordinance Violations Bureau, said provisions read as follows:

Subdivision 1. Generally.

(A) Head of Bureau. The Clerk of Court is designated as the head of each Ordinance Violation Bureau established pursuant to law and by rule of this Court.

(B) Form of Tag. The defendant shall be notified of an alleged violation of a law or ordinance by a tag in such form as the Court may from time to time approve, prepared in the number of copies and with service in the form prescribed by law.

(C) Previous Record. Before the tag is transmitted to the Bureau, there shall be endorsed thereon or attached thereto a record of violations within the same category, as set forth in Subparagraph F of this subdivision, for which the person charged has been previously convicted within the past five years, including the dates, ordinance citations and descriptions, sentences, if known, and the points assessed for each such previous violation.

(D) Time for Appearance. If any person shall fail to appear at the Bureau within five days from the service of a tag upon him, Sundays and Holidays excepted, the fine payable at the Bureau shall be increased by $1.00, and the Bureau shall notify him by mail that unless he appears within eight additional days a warrant will be issued for his arrest. If any person shall fail to appear at the Bureau within eight days thereafter, a warrant shall be issued for his arrest and a court appearance shall be mandatory.

(E) Court Appearance. Every person required or desiring to appear in Court pursuant to this rule shall be assigned a date for such appearance by the Bureau and shall be given a written memorandum of such date and the location of the Court. A copy of such memorandum shall be forwarded by the Bureau to the Department issuing the tag and to the Clerk of the appropriate court accompanied by the first copy of the tag for preparation of the calendar.

(F) Appearances. A person charged with any of the following violations set forth in the subsequent subdivisions of this rule shall appear in court at a date set by the Bureau (a) if he desires to plead not guilty, (b) if he desires to propose mitigating circumstances, (c) if a warrant has been issued for his arrest, or (d) if more than 10 points including the current alleged offense, have been accumulated for convictions under the same category of the Code within the preceding five years: otherwise such persons shall appear in person or by written power of attorney at the Bureau, execute a written form waiving a hearing in court, pleading guilty to the charge, and authorizing the person in charge of the Bureau to make the plea and pay the fine in court: such person shall pay a fine equal to $5.00 for each point, as set forth in the appropriate following subdivision of this rule, for the offense and for each point accumulated within the previous five years for convictions of offenses within the same category, and a receipt shall be issued stating that a plea of guilty and a judgment of conviction will be entered of record.

(Code, 1958 §§ 74.20—74.23, 74.25—74.28; Ord. No. 67-26, 6-5-67; Ord. No. 68-53, 7-15-68)

Bloomington

ARTICLE IV. NOISE CODE

Added by Town Ord. No. 168, 1-8-52

Sec. 10.29. Definitions.

The following words and terms when used in this Article shall have the following meanings unless the context clearly indicates otherwise.

City Official—Any duly authorized representative of the City as designated by the City Manager.

Highway—Any street, road, or public way in the City.

L10 Level—The noise level, expressed in dBA, which is exceeded ten percent of the time for a one-hour survey, as measured by test procedures approved by the City Official.

Motor Vehicle—Any self-propelled vehicle not operated exclusively upon railroad tracks and any vehicle propelled or drawn by a self-propelled vehicle and including vehicles known as trackless trolleys which are propelled by electric power obtained from overhead trolley wires but not operated upon rails, except snowmobiles.

Noise—Any erratic, intermittent, and/or statistically random oscillations which result in disturbing, harmful, or unwanted sound.

Noise Level—See sound level.

Person—An individual, firm, partnership, corporation, trustee, association, the state and its agencies and subdivisions, or any body of persons whether incorporated or not. And, with respect to acts prohibited or required herein, person shall include employees and licensees.

Sound—A temporal and spatial oscillation in pressure or other physical quantity in a medium with internal forces which causes compressions and rarefactions of that medium and which is propagable at finite speed to distant points.

Sound Level (Noise Level)—The A-weighted sound pressure level, expressed in dBA, obtained by use of a sound-level meter having characteristics as specified in the American National Standards Institutes (ANSI) Standard S1.4-1961.

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Sound Pressure Level (SPL)—Expressed in decibels (dB), is 20 times the logarithm to the base ten of the ratio of the observed sound pressure to a reference pressure of 20 micropascals.
(Code, 1958 § 166.01; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.29.01. Federal Occupational Safety and Health Act.

The following regulation is hereby adopted by reference and incorporated herein: Federal Occupational Safety and Health Act, Title 29-Labor, Code of Federal Regulations, Chapter XVII (Occupational Safety and Health Administration, Department of Labor), Part 1910 (Occupational Safety and Health Standards), Subpart G (Occupational Health and Environmental Control), Section 1910.95 (Occupational Noise Exposure), June 27, 1974.
(Code, 1958 § 166.02; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.29.015 Motor Vehicle Noise Limits. (NPC-4) 3-22-76 Ord # 76-8

Sec. 10.29.02. Noise Source Requirements.

(a) A noise source (excluding motor vehicles operating on public highways, locomotives and railroad cars, snowmobiles, construction equipment at construction sites, maintenance of utility easements, and snow plowing) within the following zoning districts (as defined in this Code) shall not exceed the L10 noise levels set forth below.

(1) Industrial or Freeway Development Zoning Districts (which may include but are not necessarily limited to foundries, plastics extrusion, heavy-equipment repair, metal treating, cement handling, concrete products, excavation processes, junk-car disposal, or any other manufacturing concern)—70 dBA as measured on the property line of the source.

(2) Business, Commercial-recreational, or Institutional Zoning Districts (which may include but are not necessarily limited to service stations, motels, restaurants, blue printers, lumber yards, drycleaners, experimental laboratories, schools, car washes, and open sales lots)—65 dBA as measured on the property line of the source.

(3) Residential Zoning District (which may include but is not limited to single-family dwellings, private schools, day-care centers, private garages, permitted home occupations, churches, public stables, marinas, multiple dwellings, and retail shops)—60 dBA in the daytime (7:00 A.M. to 10:00 P.M.) and 50 dBA in the nighttime (10:00 P.M. to 7:00 A.M.) as measured on the property line of the source.

(b) In the event that the property on which an industrial, freeway development, business, commercial-recreational, or institutional noise source is located abuts residential property, the noise source in question shall not exceed an L10 noise level of 60 dBA in the daytime (7:00 A.M. to 10:00 P.M.) and an L10 noise level of 50 dBA in the nighttime (10:00 P.M. to 7:00 A.M.) as measured on the property line abutting the source.

(c) Construction equipment, which may include but is not necessarily limited to front loaders, graders, cranes, pumps, saws, and generators, being operated at a construction site shall not exceed an L10 noise level of 85 dBA at a distance of 50 feet. See Section 10.29.07(c) of this Chapter for hours of operation.
(Code, 1958 § 166.03; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.29.03. General Testing and Measurement Procedures.

The City Official shall adopt guidelines establishing the test procedures and instrumentation to be utilized, and a copy of such guidelines shall be kept on file in the Environmental Services Section of the City.
(Code, 1958 § 166.04; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.29.04. Noise Impact Statements.

The City Official may require noise impact statements in association with, but not limited to, changes in zoning classifications; the planning of a structure; or any operation, process, installation, or alteration which may be considered as a potential noise source.
(Code, 1958 § 166.05; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.29.05. Central Air Conditioning Equipment.

The City Official must approve the location of new installations of central air conditioning plants or equipment which are exterior to a building. If the City Official determines that it is impossible to position a central air conditioning unit an acceptable distance from adjacent properties, then an alternate method of compliance shall be approved screening or buffering which will meet the requirements of Section 10.29.02 of this Chapter.
(Code, 1958 § 166.06; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.29.06. Snowmobile Requirements.

(a) Every snowmobile shall be equipped with a muffler in good working order, good repair, and in constant operation to prevent excessive or unnecessary noise.

(b) No snowmobile manufactured on or after June 30, 1970 and before February 1, 1972 shall be sold or offered for sale unless it is equipped with a muffler which limits engine noise to not more than 86 decibels on the A-scale (dBA) at 50 feet.

(c) No snowmobile manufactured on or after February 1, 1972 shall be sold or offered for sale unless it is equipped with a muffler which limits engine noise to not more than 82 decibels on the A-scale (dBA) at 50 feet.

(d) No snowmobile manufactured on or after April 1, 1975 for sale in Minnesota, except a snowmobile designed for competition purposes only, shall be sold or offered for sale unless it is so equipped that overall noise emission does not exceed 78 decibels on the A-scale at 50 feet.

(e) No snowmobile manufactured on or after July 1, 1976 for sale in Minnesota, except a snowmobile designed for competition purposes only, shall be sold or offered for sale unless it is so equipped that overall noise emission does not exceed 73 decibels on the A-scale at 50 feet.

(f) At a time when the state of the art of noise control technology permits and after promulgation of a regulation in the manner prescribed by law, the standard for snowmobile noise shall not exceed 60 decibels on the A-scale at 50 feet.

(g) No person shall modify, alter, or repair a snowmobile or its exhaust system in any manner that shall amplify or otherwise increase total engine noise above that emitted by the snowmobile as originally equipped regardless of date of manufacture.
(Code, 1958 § 166.07; Added by Ord. No. 75-49, 9-22-75).

Sec. 10.29.07. Operational Limits.

(a) Recreational Motor Vehicles. See Section 8.68 of this Code.

(b) Outdoor Power Implements. No person shall operate any outdoor power implement, including but not limited to power lawn mowers, snowblowers, power hedge clippers, or such other implements designed primarily for outdoor use, at any time other than between the hours of 7:00 A.M. and 10:00 P.M. on weekdays and 9:00 A.M. and 9:00 P.M. on weekends and holidays.

(c) Construction Activities. No person shall engage in, permit, or allow construction activities involving the use of power equipment, including but not limited to any kind of electric-, diesel-, or gas-powered machine, on Sundays or at any time other than between the hours of 7:00 A.M. and 10:00 P.M. on weekdays and 9:00 A.M. and 9:00 P.M. on Saturdays. Construction activities which can meet the requirements outlined in Section 10.29.02 are exempt from the operating limits of this paragraph.

(d) Refuse Hauling. All vehicles licensed in the City for hauling refuse shall limit their hours of operation as follows:

(1) In residential zones, from 7:00 A.M. to 10:00 P.M. on weekdays and from 9:00 A.M. to 9:00 P.M. on weekends.

(2) In all other zones, the hours of operation for the hauling of refuse shall be unrestricted unless a public nuisance is declared as defined in Section 160.01 of this Code.

(3) In the event that a nuisance is declared, the hours of pick-up in all zones other than residential shall be limited to those allowed in residential zones.

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(e) Emergency Exceptions. Situations wherein immediate work is necessary to restore property to a safe condition or when immediate work is required to protect persons or property from eminent exposure to danger are exempt from operational limits.
(Code. 1958 § 166.08; Added by Ord. No. 75-49, 9-22-75)

Sec. 10.30. Public Nuisance Noises Prohibited.

It shall be unlawful for any person to make, continue, or cause to be made or continued any loud, unnecessary, or unusual noise or any noise which either annoys, disturbs, injures, or endangers the comfort, repose, health, peace, or safety of others within the limits of the City. The following acts, among others, are declared to be nuisance noises in violation of this Article but said enumeration shall not be deemed to be exclusive.

(1) *Horns, signaling devices*, etc.

(A) The sounding of any horn or signaling device on any automobile, motorcycle, or other vehicle on any street, public place, or private property within the City except as a danger warning;

(B) The creation by means of any such signaling device of any unreasonably loud or harsh sound;

(C) The sounding of any such device for an unnecessary and unreasonable period of time;

(D) The use of any signaling device except one operated by hand or electricity;

(E) The use of any horn, whistle, or other device operated by engine exhaust;

(F) The use of any such signaling device when traffic is held up for any reason.

(2) *Radios, phonographs*, etc. The use, operation, or permitting the playing, use, or operation of any radio receiving set, musical instrument, phonograph, or other machine or device for the production or reproduction of sound in such manner as to disturb the peace, quiet, and comfort of the neighboring inhabitants or at any time at a louder volume than is necessary for convenient hearing for the person or persons who are in the room, vehicle or chamber in which such machine or device is operated and who are voluntary listeners thereto.

(3) *Loud speakers, amplifiers for advertising*, etc. The use, operation, or permitting the playing, use, or operation of any radio receiving set, musical instrument, phonograph, loud speaker, sound amplifier, or other machine or device for the production or reproduction of sound which is cast upon the public streets for the purpose of commercial advertising or attracting the attention of the public to any building or structure, except as may be licensed by the City pursuant to Article V of this Chapter.

(4) *Yelling, shouting*, etc. Yelling, shouting, hooting, whistling, or singing on the public streets, particularly between the hours of 10:00 P.M. and 7:00 A.M. or at any time or place so as to annoy or disturb the quiet, comfort, or repose of persons in any office, dwelling, hotel, or other type of residence, or of any persons in the vicinity.

(5) *Animals, birds, etc.* The keeping of any animal or bird which by causing frequent or long continued noise shall disturb the comfort or repose of any persons in the vicinity.

(6) *Whistles.* The blowing of any locomotive whistle or whistle attached to any stationary boiler except:

(A) To give notice of the time to begin or stop work;

(B) To give warning of fire or danger; or

(C) Upon request of proper City authorities.

(7) *Exhaust.*

(A) The discharge into the open air of the exhaust of any steam engine, stationary internal combustion engine, motor boat, or motor vehicle except through a muffler or other device which will effectively prevent loud or explosive noises therefrom.

(B) Mufflers of the type commonly known as "Hollywood Mufflers" shall not be permitted.

(8) *Defective vehicles or loads.* The use of any automobile, motorcycle, or vehicle so out of repair or so loaded in such manner as to create loud and unnecessary grating, grinding, rattling, or other noise.

(9) *Loading, unloading, unpacking,* etc. The creation of a loud and excessive noise in connection with loading, unloading or unpacking of any vehicle.

(10) *Noises near schools, courts, churches, or hospitals.* The creation of any excessive noise on any street adjacent to any school, institution of learning, church, court or hospital while the same is in use which unreasonably interferes with the workings of such institution, or which disturbs or unduly annoys patients in the hospital, provided that conspicuous signs are displayed in such streets indicating that the same is a school, hospital, church, or court street.

(11) *Hawking, peddling,* etc. The shouting and crying of peddlers, hawkers, and vendors which disturbs the peace and quiet of the neighborhood.

(12) Snow plowing.

(Code. 1958 §§ 166.02, 166.03; Ord. No. 71-59, 8-2-71; Ord. No. 74-67, 8-19-74; Ord. No. 75-49, 9-22-75, renumbered to § 166.09)

Sec. 10.31. Exceptions.

It is recognized that under certain circumstances it would be impossible for a noise source to comply with the provisions of Section 166.03 of this Chapter due to economic or technological reasons. In cases such as this, application for an exception may be made in writing to the City Official. The application shall contain the following pertinent information:

(1) Dates for exception requested,

(2) Location of particular noise source and times of operation,

(3) Equipment involved,

(4) Necessity for request of exception,

(5) Steps taken to minimize noise level from source, and

(6) Names of responsible persons.

The City shall notify by mail all property owners within 500 feet of the source in question of the requested exception. Applications will be reviewed by the City Official, and a decision to approve or deny the exception will be made in writing to the responsible persons within 20 days of receipt.

(Code.1958 § 166.10:Added by Ord. No. 75-49,9-22-75)

Sec. 10.32. Appeal of Exception Process.

The decision made by the City Official concerning the exception request may be appealed to the City Council within ten days after receiving the City Official's written decision. The appeal shall be filed in writing with the City Clerk who shall schedule a hearing before the City Council as soon as possible. A written report shall accompany the request for appeal. The report shall contain pertinent information which would adequately justify the request for an exception.

(Code.1958 § 166.10:Added by Ord.No.75-49,9-22-75)

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ORDINANCE NO. 76-2

AN ORDINANCE TO AMEND SECTION 107.03 OF THE CITY CODE TO INCLUDE A FURTHER EXCEPTION TO THE PROHIBITIONS OF SNOWMOBILE USE WITHIN THE CITY

Section 1. That Section 107.03 of the City Code is hereby amended to read as follows: (10.29.06)

107.03 Regulations.

(a) Prohibition. It shall be unlawful for any person to operate snowmobiles on publicly or privately owned property within the City.

(b) Exceptions. This prohibition shall not apply to:

(1) The loading of snowmobiles upon a trailer or the removal therefrom; [and]

(2) The use of a snowmobile for a rescue, emergency, of law-enforcement purpose; or

(3) The use of snowmobiles for park maintenance.

Passed and adopted this 23rd day of February, 1976.

Mayor

ttest:

ity Clerk

PPROVED:
City Attorney

CITY OF BLOOMINGTON

Division D. Recreational Motor Vehicles.

Sec. 8.64. Purpose and Intent.

The purpose of this Division is to provide reasonable regulations for the use of recreational motor vehicles on public and private property in the City. This Division is not intended to allow what the Minnesota Statutes prohibit nor to prohibit what the Minnesota Statutes expressly allow. It is intended to prevent a public nuisance.
(Code. 1958 § 110.01; Ord. No. 74-48, 5-28-74)

Sec. 8.65. Definition.

The following words and terms when used in this Division shall have the following meanings unless the context clearly indicates otherwise:

Recreational motor vehicle—Any self-propelled vehicle and any vehicle propelled or drawn by a self-propelled vehicle used for recreational purposes, including but not limited to trail bike or other all-terrain vehicle, hovercraft, or motor vehicle licensed for highway operation which is being used for off-road recreational purposes, but not including snowmobiles as defined in Section 8.53 of this Code.
(Code. 1958 § 110.02; Ord. No. 74-48, 5-28-74)

Sec. 8.66. Prohibited Areas and Acts.

It is unlawful for any person to operate a recreational motor vehicle:

(1) On private property of another without specific written permission of the owner of said property. Written permission may be given by a posted notice of any kind or description, so long as it specifies the kind of vehicles allowed, that the owner, occupant, or lessee prefers such as by saying "Recreational Vehicles Allowed," "Trail Bikes Allowed," "All-Terrain Vehicles Allowed," or words substantially similar.

(2) On publicly owned land including school grounds, park property, playgrounds, recreation areas and golf courses, except where permitted by this Division.

(3) In a manner so as to create a loud, unnecessary, or unusual noise which disturbs, annoys, or interferes with the peace and quiet of other persons.

(4) On a public sidewalk or walkway provided or used for pedestrian travel.

(5) At any place while under the influence of intoxicating liquor or narcotics or habit forming drugs.

(6) At a rate of speed greater than reasonable or proper under all the surrounding circumstances.

(7) At any place in a careless, reckless, or negligent manner so as to endanger or be likely to endanger any person or property or to cause injury or damage thereto.

(8) On any public street, highway, or right-of-way, unless licensed pursuant to Minnesota law.

(9) To intentionally drive, chase, run over, or kill any animal, wild or domestic.

(10) To operate or halt any recreational motor vehicle carelessly or heedlessly in disregard of the rights or the safety of others, in a manner so as to endanger or be likely to endanger any person or property or in excess of 25 miles per hour on publicly owned lands.

(11) Within 150 yards of any public recreational area or gathering of people. This provision does not apply to the occasional use of recreational motor vehicles on private property for the purpose of loading or unloading it from a trailer or for mechanically checking it.
(Code. 1958 § 110.03; Ord. No. 74-48, 5-28-74)

Sec. 8.67. Street Crossings.

No person under 14 years of age operating the vehicles regulated herein shall make a direct crossing of any street, highway, or public right-of-way.
(Code. 1958 § 110.04)

Sec. 8.68. Hours for Use.

The hours for use are 8:00 A.M. to 10:00 P.M.

(Code. 1958 § 110.05)

Sec. 8.69. Minimum Equipment Requirements.

(a) Standard mufflers shall be properly attached and in constant operation to reduce the noise of operation of the motor to the minimum necessary for operation. No person shall use a muffler cutout, by-pass, straight pipe, or similar device on a recreational motor vehicle motor; and the exhaust system shall not emit or produce a sharp popping or crackling sound.

(b) Brakes shall be adequate to control the movement of and to stop and hold under any conditions of operation.

(c) At least one clear lamp shall be attached to the front with sufficient intensity to reveal persons and vehicles at a distance of at least 100 feet ahead during the hours of darkness under normal atmospheric conditions. Such head lamp shall be so aimed that glaring rays are not projected into the eyes of an oncoming vehicle operator. It shall also be equipped with at least one red tail lamp having a minimum candlepower of sufficient intensity to exhibit a red light plainly visible from a distance of 500 feet to the rear during the hours of darkness under normal atmospheric conditions. This equipment shall be required and shall be in operating condition when the vehicle is operated between the hours of one-half hour after sunset to one-half hour before sunrise or at times of reduced visibility.
(Code. 1958 § 110.06; Ord. No. 74-48, 5-28-74)

Sec. 8.70. Designation of Public Areas for Use.

(a) The Council may designate areas for use of recreational motor vehicles by approval of a majority of the members of the City Council. The areas designated may be changed from time to time by the City Council. Any area designated shall be published in the official newspaper of the City in a conspicuous place after such approval. If an area is changed, such change shall be published in like manner in the official newspaper of the City. An up-to-date map of designated park areas open for recreational motor vehicle use shall be kept on file in the office of the City Clerk; and, the City Manager shall provide, on request, a copy of such map together with the applicable rules, regulations, and this Division to each person requesting such information from the City.

(b) Unless designated by the City Council as an area for recreational motor vehicles, the use on City park property shall be unlawful. Further, the use in City parks designated by the City Council shall be in accordance with all of the applicable provisions of this Division and the rules and regulations of the Director of Park and Recreation.
(Code. 1958 § 110.07; Ord. No. 74-48, 5-28-74)

Sec. 8.71. Penalty.

Any person violating the terms of this Division shall, upon conviction thereof be fined a sum not to exceed $300.00 or shall be imprisoned for a period not to exceed 90 days or both.
(Code. 1958 § 110.08)

ARTICLE V. SOUND TRUCKS

Added by Ord. No. 63-14, 6-24-63

Sec. 10.33. Definitions.

The following words and terms, when used in this Article, shall have the following meanings, unless the context clearly indicates otherwise:

Sound amplifying equipment—Any machine or device for the amplification of the human voice, music, or any other sound. "Sound amplifying equipment" as used herein shall not be construed as including standard automobile radios when used and heard only by occupants of the vehicle in which installed, or warning devices on authorized emergency vehicles or horns or other warning devices on other vehicles used only for traffic safety purposes.

Sound truck—Any motor vehicle, or horse-drawn vehicle, having mounted thereon, or attached thereto, any sound amplifying equipment.
(Code, 1958 § 95.01)

Sec. 10.34. Noncommercial Use of Sound Trucks.

(a) *Registration required.* No person shall use, or cause to be used, a sound truck with its sound amplifying equipment in operation for noncommercial purposes in the City of Bloomington unless he has first filed a registration statement with the City Clerk in writing. The registration statement shall be filed in duplicate and shall state the following:

(1) Name and home address of the applicant.
(2) Address of place of business of applicant.
(3) License number of the sound truck.
(4) Name, address, and telephone number of person who owns the sound truck.
(5) Name, address, and telephone number of person having direct charge of sound truck.
(6) Names and addresses of all persons who will use or operate the sound truck.
(7) The purpose for which the sound truck will be used.
(8) A general statement as to the section or sections of the City in which the sound truck will be used.
(9) Proposed hours of operation of the sound truck.
(10) The number of days of proposed operation of the sound truck.
(11) A general description of the sound amplifying equipment which is to be used.
(12) The maximum sound producing power of the sound amplifying equipment to be used in or on the sound truck, including a statement of:
  (A) The wattage to be used.
  (B) The volume in decibels of the sound which will be produced.
  (C) The approximate maximum distance for which sound will be thrown from the sound truck.

(b) *Registration statement amendment.* All persons using or causing to be used, sound trucks for noncommercial purposes shall amend any registration statement filed pursuant to this section within 48 hours after any change in the information herein furnished.

(c) *Registration and identification.* The City Clerk shall return to each applicant one copy of the registration statement duly certified by the City Clerk as a correct copy of said application. The certified copy of the application shall be in the possession of any person operating the sound truck at all times while the sound truck's sound amplifying equipment is in operation and the copy shall be promptly displayed and shown to any police officer of the City of Bloomington upon request.

(d) *Regulations for use.* Noncommercial use of sound trucks in the City of Bloomington with sound amplifying equipment in operation shall be subject to the following regulations:

(1) The only sounds permitted are music or human speech.

(2) Operations are permitted for four hours each day except on Sundays and legal holidays when no operations shall be authorized. The permitted four hours of operation shall be between the hours of 11:30 A.M. and 1:30 P.M. and between the hours of 4:30 P.M. and 6:30 P.M.

(3) Sound amplifying equipment shall not be operated on the public streets unless the sound truck upon which such equipment is mounted is operated at a speed of at least ten miles per hour except when said truck is stopped or impeded by traffic. Where stopped on the public streets the sound amplifying equipment shall not be operated for longer than one minute.

(4) Sound shall not be issued within 100 yards of schools or churches.

(5) The human speech and music amplified shall not be profane, lewd, indecent, or slanderous.

(6) The volume of sound shall be controlled so that it will not be audible for a distance in excess of 100 feet from the sound truck and so that the sound is not unreasonably loud, raucous, jarring, disturbing, or a nuisance to persons within the area of audibility.

(7) No sound amplifying equipment shall be operated with an excess of 15 watts of power in the last stage of amplification.
(Code, 1958 § 95.02)

Sec. 10.35. Commercial Advertising by Sound Truck.

(a) *License required.* No person shall operate, or cause to be operated, any sound truck in the City of Bloomington for commercial advertising purposes with sound amplifying equipment in operation unless a license has been obtained from the City Clerk. The fee for said license shall be $100.00.

(b) *Application for license.* Persons applying for the license shall file with the City Clerk an application in writing giving in said application the information required in the registration statement under Section 10.34 of this Article.

(c) *Issuance of license.* The City Clerk shall issue a license upon payment of the required license fee if the application shows that the licensee complies with the regulations and requirements of Section 10.34 of this Article and other provisions of the City Code.

(d) *Possession and display of license.* A licensee shall keep such license in his possession in the sound truck during the time the sound truck's sound amplifying equipment is in operation. The license shall be promptly displayed and shown to any police officer of the City of Bloomington upon request.

(e) *Regulations for Use.* No person shall operate, or cause to be operated, any sound truck for commercial sound advertising purposes in violation of the regulations set forth in Section 10.34(d) of this Article.
(Code, 1958 § 95.03)

Sec. 10.36. Penalties.

Any person who violates any provision of this Article shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine of up to $300.00 or by imprisonment for not more than 90 days, or both.
(Code, 1958 § 95.04)

Sec. 19.65. Off-street Loading.

(a) In connection with any structure which is to be erected or substantially altered, and which requires the receipt or distribution of materials or merchandise by trucks or similar vehicles, there shall be provided off-street loading space on the basis of the following minimum requirements:

Square feet of aggregate gross floor area	*Minimum required number of berths*
Up to 10,000	0
10,000 to 16,000	1
16,000 to 40,000	2
For each additional 40,000	1 additional

The size of the berths will depend upon the size of the trucks to be used.

(b) No loading berth of vehicles over two ton capacity shall be closer than 100 feet to any residential district unless completely enclosed by buildings walls not less than eight feet in height.

→ (c) Where noise from loading or unloading activity is audible in a residential district, the activity shall terminate between the hours of 7:00 p.m. and 7:00 a.m.

(Code, 1958 § 10.02)

BLOOMINGTON
CITY CODE

Sec. 12.08.01. Participation in Noisy Parties or Gatherings.

(a) No person shall congregate because of, or participate in, any party or gathering of people from which noise emanates of a sufficient volume or of such nature to disturb the peace, quiet, or repose of other persons.

(b) A police officer may order all persons present other than the owners or tenants of the building or place to immediately disperse. Any person who shall refuse to leave after being ordered to do so by a police officer shall be guilty of a violation of this Division.

(c) Any owner or tenant of the building or place who has knowledge of the disturbance and fails to immediately abate said disturbance shall be guilty of a violation of this Division.
(Code, 1958 § 174.07; Added by Ord. No. 74-36, 5-13-74)

B.1.3 Complaint response procedure

a. The complaint is formally registered by the secretary for Environmental Services on a yellow citizen-complaint record.

b. Noise enforcement staff contacts the complainant as soon as possible to obtain more information on the specifics of the noise problem.

c. Enforcement staff contacts the alleged violator in person, by phone, or by letter. Certain types of noise complaints are easily handled by telephone, such as early trash pickup. The supervisor of the trash haulers is contacted and informed that a repeat violation will result in the issuance of a citation.

In other cases, a personal visit is necessary to witness the violation or to discuss the alleged violation, such as early construction noise. When a personal visit is made, a correction of conditions is issued to further the impact of the verbal order. Orders are generally issued for an immediate halt to the violation in these types of complaints.

When the noise is constant (e.g., central air conditioners), a sound level meter measurement is performed. In all cases where a violation is observed, written orders are issued to the violator with a time frame given for compliance (usually two weeks for complicated noise sources that are difficult to abate). But, if a noise source is extremely noisy [e.g., over 60 dB(A)] and is continuous, orders are given to immediately discontinue use from 10 p.m. to 7 a.m.

d. For most barking dog complaints, a letter is written to the alleged violator. This letter usually spurs the dog owner to call City staff, and both parties discuss the problem. In most cases, attempts are made to verify the complaint, but verification is very difficult.

e. The complainant is kept informed of the progress of the elimination of the problem. Complainants are always encouraged to call City staff if the problem recurs.

B.1.4 Previous noise laws

Before the present comprehensive noise code was adopted, City enforcement staff used the general nuisance definition of noise pollution. This definition stated that "the making, creation, or maintenance of loud, unnecessary, unnatural, or unusual noises, which are prolonged, unusual, and unnatural in their time, place, and use, affect and are a detriment to public health, comfort, convenience, safety, welfare, and prosperity of the residents of the City." As is common knowledge, this type of definition is difficult to interpret and enforce.

B.1.5 Events responsible for the present law

The City noise code was developed out of citizen complaints and response to noise pollution. A few residents were instrumental in providing a public awareness of the need for a noise pollution ordinance. Many complaints centered around the noise created by traffic. In addition, because of the vast amount of construction activity in Bloomington, several residents requested a curfew on construction. Curfews were also applied to refuse haulers.

The City Council was intensely involved in the adoption of the noise code. Several public hearings were held before the adoption of the ordinance. Various interest groups (Chamber of Commerce, citizen groups) were involved in these public hearings. Of importance was the fact that the Mayor and City Council recognized noise as a threat to the public health and welfare, and they realized the need to control this ever-increasing danger to a healthful community.

B.1.6 Instrumentation

a. *B&K 2205* — This meter is used because of its portability, ease of calibration, and reliability. This instrument is used mainly for property line measurements and general noise surveys.

b. *Progressive Design (PD) 9901* — This meter is used for motor vehicle noise enforcement and is manufactured locally. Benefits of this meter include:

- Digital display
- Maximum-hold switch
- Low cost ($650).
- Durable meter and microphone
- Excellent dynamic range.

c. *Progressive Design ENM* — This meter is used by the citizens of Bloomington for intermittent and late-night noises. This meter, which is manufactured locally, is similar in appearance to the PD 9901. With this meter, the citizen can set the tabulated noise reading for noise levels above 50, 55, 60, or 65 dB(A). When set, at the end of an hour the meter will record, in seconds, time above the set noise limit. This meter is very helpful in verifying and defining intermittent and late-night noise problems. If necessary, the citizen can use these readings in a formal complaint.

B.1.7 Noise-related problems not dealt with by primary agency (Department of Community Development)

a. Complaints about noisy parties and minibikes and some barking dog complaints are handled by the City Police Department.

b. Complaints regarding highway traffic noise or airport noise go to the Minnesota Pollution Control Agency.

c. Airplane noise complaints are also dealt with by the Metropolitan Airports Commission.

B.1.8 Some problems with current program

a. No standards for impulsive sources of noise.

b. Intermittent sources of noise (such as barking dogs) and late-night noises are difficult to observe. A vast amount of time is expended by enforcement staff to verify these problems.

B.1.9 Approximate annual program costs (1978)

a.	Salaries and benefits (one person, 35% of full time)	$ 7,650
b.	Automobile	1,300
c.	Public information, pamphlets, noise signs	1,900
d.	Equipment maintenance, repair	100
e.	Interdepartmental services	2,000
f.	Supporting services	350
g.	Communications, conference, travel	550
		$13,850

B.1.10 Nonenforcement noise-related services

a. General noise surveys are commonly performed by City noise staff. For example, proposed HUD projects are checked for unacceptable noise exposure. If the noise level is above acceptable limits, the project is terminated or some type of design, based on noise consideration, is proposed.

b. Upon request by a citizen, City staff will perform a noise survey at the citizen's property line. These requests are fairly common from residents who live near a busy street or the airport.

c. All refuse trucks that haul in Bloomington must have a mechanical inspection. Included in this inspection is an examination of the exhaust system. If the exhaust system is in good order, a license is issued.

d. Bloomington is actively involved in the training of personnel in communities that wish to adopt, or have already adopted, a noise code. Training is provided to teach enforcement techniques and use of the sound level meter.

B.1.11 Other statistics

a. Population — 85,000.

b. Complaints received — 60 to 90 per year.

c. Percent of total complaints that were about barking dogs — 30%.

d. Percent of complaints (excluding barking dogs) for which noise measurements were made — 15%.

B.2 Hillsborough, Florida — Environmental Protection Commission

B.2.1 Description of laws

a. *Chapter 67-1504, Hillsborough County Environmental Protection Act* — Designates the Board of County Commissioners as the Environmental Protection Commission of Hillsborough County, defines its duties and powers, includes noise as an emission that may result in a nuisance, prohibits nuisances, defines noise pollution, and prohibits noise pollution.

b. *Permit and Appeal Procedures. Chapter 1-10, Rules of the Hillsborough County Environmental Commission, Noise* — Establishes sound level limit in terms of maximum A-weighted sound levels as measured at or within the property line of the receiving land use.

Limits depend upon land use and time of day, for example:

Residential – 60 dB(A) daytime (7 a.m. to 10 p.m.)
– 55 dB(A) nighttime.

Has correction for pure tone and for short duration noise. Places restrictions on air-conditioning or air-handling equipment, motor vehicles, recreational motorized vehicles, and motor vehicles operated at facilities for competitive events. Defines and prohibits noise disturbances.

B.2.2 Copies of laws, Hillsborough County, FL

HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION ACT
CHAPTER 67-1504
(As Amended)*

Section 1 Short title
Section 2 Declaration of legislative intent
Section 3 Definitions
Section 4 Creation of the Hillsborough county environmental protection commission
Section 5 Environmental protection commission: duties and powers
Section 6 Hearing officer; duties and powers
Section 7 Environmental director
Section 8 Environmental director: duties and powers
Section 9 Appeals from actions or decisions of the environmental director
Section 10 Reporting of sources
Section 11 Permits may be required
Section 12 Sampling and testing
Section 13 Open burning prohibited
Section 14 Repealed (Chapter 73-496, Laws of Florida)
Section 15 Violations; notice; citations
Section 16 Emergency order; penalties
Section 17 Nuisances prohibited
Section 18 Prohibition, violation, penalty, intent
Section 19 Enforcement; procedure; remedies; proceedings for injunction
Section 19A Additional civil liability; assessment of damages
Section 20 Appropriations
Section 21 Construction of act
Section 22 Consolidation of governments
Section 23 Severability
Section 24 Effective date

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*AMENDED BY CHAPTERS 69-1149; 71-681; 72-563; 73-496; LAWS OF FLORIDA

CHAPTER 67-1504
AS AMENDED

Be It Enacted by the Legislature of the State of Florida:

Section 1. Short title.—This act may be known and cited as the "Hillsborough County Environmental Protection Act."

Section 2. Declaration of Legislative Intent.—The legislature finds and declares that the reasonable control and regulation of activities which are causing or may reasonably be expected to cause pollution or contamination of air, water, soil, and property, or cause excessive and unnecessary noise may be necessary for the protection and preservation of the public health, safety, and welfare. It is the intent and purpose of this act to designate the board of county commissioners as the environmental protection commission of Hillsborough county to provide and maintain for the citizens and visitors of said county standards which will insure the purity of all waters consistent with public health and public enjoyment thereof, the propagation and protection of wildlife, birds, game, fish and other aquatic life and atmospheric purity and freedom of the air from contaminants or synergistic agents injurious to human, plant, or animal life and excessive and unnecessary noise, which unreasonably interfere with comfortable enjoyment of life or property or the conduct of business.

Section 3. Definitions.—As used in this act and said rules and regulations, the following words and phrases shall have the following meanings unless some other meaning is plainly indicated:

(1) "County" shall mean Hillsborough county, Florida.

(2) "Air contaminants" shall mean a particulate matter as defined herein, gas, or odor, including but not limited to, smoke, charred paper, dust, soot, grime, carbon or any other particulate matter, or irritating or malodorous noxious acids, fumes or gases, or any combination thereof, but shall not include uncombined water vapor.

(3) "Air pollution" shall be construed to mean the presence in the outdoor atmosphere of one or more air contaminants or combination thereof in such quantities and of such duration as to be injurious to human, plant or animal life, or property, or which unreasonably interfere with the comfortable enjoyment of life or property, or the conduct of business.

(4) "Combustion contaminants" shall mean particulate matter discharged into the atmosphere from the burning of any kind of material containing carbon in a free or combined state.

(5) "Combustible refuse" shall mean any combustible waste material containing carbon in a free or combined state.

(6) "Condensed fumes" shall mean minute solid particles generated by the condensation of vapors from solid matter volatilization from the molten state, or which may be generated by chemical processes, operations, or reactions, when such processes create airborne particles.

(7) "Dusts" shall mean minute solid particles released into the air by natural forces or by mechanical processes including, but not limited to, crushing, grinding, milling, drilling, demolishing, shoveling, conveying, covering, bagging, sweeping.

(8) "Emission" shall mean the act of passing into the atmosphere an air contaminant or gas stream which contains or may contain an air contaminant; or the material so passed to the atmosphere.

(9) "Flue" shall mean any duct or passage for air, gases, or airborne materials, such as a stack or chimney.

(10) "Gas" shall mean a formless fluid which occupies space and which can be changed to a liquid or solid state only by increasing pressure with decreased or controlled temperature, or by decreased temperature with increased or controlled pressure.

(11) "Mist" shall mean a suspension of any finely divided liquid in any gas.

(12) "Nuisance" shall mean and include the use of any property, facilities, equipment, processes, products or compounds, or the commission of any acts, that cause or materially contribute to:

(a) The emission into the outdoor air of dust, fumes, gas, mist, odor, smoke, or vapor, or noise or any combination thereof, of such character and in such quantity or level as to be detectable by a considerable number of persons or the public, so as to interfere with such person or the public health, repose or safety, or to cause severe annoyance or discomfort, or which emission tends to lessen normal food and water intake, or produces irritation of the upper respiratory tract, or produces symptoms of nausea, or is offensive or objectionable to, or causes injury or damage to real property, personal property or human, animal or plant life of any kind, or which interferes with normal conduct of business, or is detrimental or harmful to the health, comfort, living conditions, welfare and safety of the inhabitants of the county.

(b) The discharge into any of the waters of the county of any organic or inorganic matter or deleterious substance or chemical compounds, or thermal energy or any effluent containing the foregoing, in such quantities, proportions or accumulations as to be detectable at any point beyond the property limits of the premises occupied or used by the person responsible for the source thereof, so as to interfere with the health, repose or safety of any considerable number of persons or the public, or to cause severe annoyance or discomfort, or which tends to lessen normal food and water intake, or produces symptoms of nausea, or is offensive or objectionable or causes injury or damage to real property, personal property, human, plant or animal life of any kind or which interferes with normal conduct of business, or is detrimental or harmful to the health, comfort, living conditions, welfare and safety of the inhabitants of the county.

(c) Any violation of the provisions of the act

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which becomes detrimental to health or threatens danger to the safety of persons or property, or gives offense to, is injurious to, or endangers the public health and welfare, or prevents the reasonable and comfortable use and enjoyment of property by any considerable number of the public.

(13) "Odor" shall mean that property of a substance which materially offends the sense of smell.

(14) "Particulate matter" shall mean any material which at standard conditions is emitted into the atmosphere in a finely divided form as liquid or solid or both, but shall not include uncombined water vapor.

(15) "Standard conditions" shall mean, at ground level, a pressure of 14.7 pounds per square inch absolute and a temperature of seventy (70) degrees Fahrenheit.

(16) "Person" shall be construed to include any natural person, individual, public or private corporation, firm, association, joint venture, partnership, municipality, governmental agency, political subdivision, public officer, or any other entity whatsoever, or any combination of such, jointly or severally.

(17) "Smoke" shall mean the solid particles produced by incomplete combustion of organic substances including, but not limited to, particles, fly ash, cinders, tarry matter, soot and carbon.

(18) "Standard methods" shall mean the manual entitled "Standard Methods for the Examination of Water and Waste Matter," according to the most recent edition, as published jointly by The American Public Health Association, American Water Works Association, and Water Pollution Control Federation.

(19) "Vapor" shall mean any mixed material in a gaseous state which is formed from a substance, usually a liquid, by increased temperature.

(20) "Waste discharge" shall mean any outfall, ditch, pipe, soakage pit, drainage well, drainfield, or any other method or device by which treated or untreated sewage, industrial wastes, or other wastes can enter the surface waters, tidal salt waters, or ground waters, so as to cause water pollution as herein defined.

(21) "Water pollution" shall mean any contamination, destruction, or other alteration, or any activity which contributes to such contamination, destruction or other alteration, of any physical, chemical or biological feature or property of any waters of the county, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the county as will create or may reasonably be expected to create a nuisance or render such waters harmful, detrimental, or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild anmials, birds, fish or other aquatic life.

(22) "Compliance tests" shall mean tests made to determine compliance with the provisions of this act and the rules and regulations promulgated hereunder.

(23) "Open burning" shall mean any fire wherein the products of combustion are emitted into the open air, and are not directed thereto through a stack or chimney.

(24) "Rules and regulations" shall mean rules and regulations adopted pursuant to this act.

(25) "Board" shall mean the board of county commissioners of Hillsborough county.

(26) "Commission" shall mean the environmental protection commission of Hillsborough county.

(27) "Hearing officer" shall mean that person appointed by the Commission in the manner prescribed herein.

(28) "Noise pollution" shall mean the presence of noise in excessive or unnecessary amount or of such duration, wave frequency or intensity as to be injurious to human or animal life or property; or which unreasonably interferes with the comfortable enjoyment of life or property, or other conduct of business.

Section 4. Creation of the Hillsborough county environmental protection commission.—The environmental protection commission is hereby created and estabiished. The commission shall consist of the duly elected members of the Hillsborough county board of county commissioners.

Section 5. Environmental protection commission; duties and powers.—The commission shall have the following duties, functions, powers and responsibilities:

(1) To implement and enforce the provisions of this act.

(2) To adopt, revise and amend from time to time appropriate rules and regulations reasonably necessary for the implementation and effective enforcement, administration and interpretation of the provisions of this act and to provide for the effective and continuing control and regulation of air, water and noise pollution in the county within the framework of this act, and to provide for appropriate fees to be charged by the commission for the services rendered under the provisions of this act. No such rules or regulations shall be adopted or become effective, including amendments, until after a public hearing has been held by the commission pursuant to notice published in a newspaper of general circulation in the county at least ten (10) days prior to the hearing, and then until the rules and regulations have been filed pursuant to law.

(3) To make continuing studies and periodic reports and recommendations for the improvement of air, water and noise in the county, and to work in cooperation with the Florida department of pollution control and other appropriate agencies and groups interested in the field of air, water and noise pollution.

(4) To investigate air pollution, water pollution and noise pollution control programs and activities in operation in other areas and to make recommendations for the improvement of the regulation, administration and enforcement of pollution controls in the county; to publicize the importance of adequate pollution controls, to hold public hearings, discussions, forums and institutes, and arrange programs for the presentation of information by experts in the field of air, water and noise pollution, and to visit and study pollution control programs conducted in other areas, subject to budget limitations.

(5) To issue subpoenas to compel the attendance of witnesses at any hearing who may have information relevant to any issue before the commission.

(6) To designate a hearing officer, who shall be a member of the Florida Bar, to hear appeals from actions or decisions of the environmental director, and any matters relating to this chapter which the commission may refer.

Section 6. Hearing officer; duties and powers.—

(1) A hearing officer shall be appointed by the commission. The hearing officer shall hear and determine all disputes concerning actions or decisions of the environmental director relating to compliance with this act and rules and regulations promulgated pursuant to this act. The hearing officer also shall hear and determine any matters relating to this act which the commission may delegate to said officer. All hearings shall be public. The hearing officer shall have the power to issue notices of hearings, subpoenas requiring the attendance of witnesses and the production of evidence, to administer oaths and take testimony as may be necessary. A written decision containing findings of fact, conclusions of law and recommendations shall be promptly rendered to the commission in each case; provided, however, all hearings for the adoption of rules shall be before the commission.

(2) The hearing officer shall give probative effect to evidence which would be admissible in civil proceedings in the courts of this state, but in receiving evidence due regard shall be given to the technical and highly complicated subject matter which the commission and director must handle and the exclusionary rules of evidence shall not be used to prevent the receipt of evidence having substanial probative effect. Otherwise effect shall be given to the rules of evidence recognized by the law in this state.

(3) The hearing officer shall be compensated for his services from the general revenue fund of Hillsborough county and such compensation shall be set by the commission.

Section 7. Environmental director.—The Hillsborough county environmental protection commission shall appoint an environmental director. Said environmental director shall have at least a bachelor's degree from an accredited university and possess such experience in such a field which will, in the judgment of the commission, qualify him to discharge the duties imposed by this act. The environmental director shall be subject to the supervision of the commission and shall serve at the pleasure of the commission. Compensation for such director shall be determined by the commission and paid from the general funds of Hillsborough county.

Section 8. Environmental director; duties and powers.—The duties, functions, powers and responsibilities of the environmental director, or his agents, shall include the following:

(1) Serve as technical secretary to the commission, to handle correspondence, investigations and prepare reports and data between meetings.

(2) The enforcement of the provisions of this act and the rules and regulations.

(3) Investigation of complaints, study and observation of air, water and noise pollution conditions, and recommendations as to institution of actions necessary to abate nuisances caused by air, water and noise pollution, as to prosecution of proceedings for violations of this act.

(4) Making of inspections of property, facilities, equipment and processes to determine whether the provisions of this act are being complied with.

(5) To intervene for the purpose of providing environmental impact statements, recommendations and advice in matters having or likely to have an effect upon the environment of Hillsborough county.

(6) Establishing, operating and maintaining a continuous program for monitoring air, water and noise pollution by means of county-wide air and water quality surveillance networks designed to provide accurate data and information as to whether the requirements of this act are being complied with and whether the level of air, water and noise pollution is increasing or decreasing throughout the county.

(7) Publication and dissemination of information to the public concerning air, water and noise pollution.

(8) Cooperation with appropriate public agencies.

(9) To enter upon any public or private premise or carrier during regular business hours in the performance of his duties relating to pollution control to inspect and copy records pertaining to same.

(10) To sample, test, inspect, and make analyses with respect to pollution control within the provisions of this law and rules adopted hereunder, at any time and place and to such an extent as he may deem necessary to determine whether possible sources of pollution are in compliance with the provisions of this law.

(11) To perform all other duties necessary to effect the purpose of this act, including the implementation of those duties of the commission set forth in section 5 (3), (4) and (5) and section 19 and 19A of this act.

Section 9. Appeals from actions or decisions of environmental director.—Any person aggrieved by an action or decision of the environmental director may appeal to the commission by filing within twenty (20) days after the date of the action or decision complained of, a written notice of appeal which shall set concisely the action or decision appealed from and the reasons or grounds for the appeal.

The notice of appeal shall be filed with the chairman of the commission. The hearing officer shall set such appeal for hearing at the earliest reasonable date, and cause notice thereof to be served upon the appellant and the environmental director. The hearing officer shall file his report and recommendations with the commission and serve copies on the parties. The parties may serve exceptions to the report within ten (10) days from the date it is served on them. If no exceptions are filed within the period, the commission shall take appropriate action on the report. If exceptions are filed they shall be heard on reasonable notice by either party. In such proceeding

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to review exceptions to the hearing officer's report, the commission shall promptly render a written decision affirming, reversing or modifying the decision of the hearing officer, provided that the commission shall not take any action which conflicts with or nullifies any of the provisions of this act or rules enacted pursuant to the act. Any person aggrieved by the final administrative decision may seek review in accordance with the administrative procedure act, chapter 120, part III, Florida Statutes.

Section 10. Reporting of sources.—Any person engaging in any activity or operation which may be a source of air, water or noise pollution shall at the written request of the environmental director file with the commission on a form approved by the commission containing information relating to the processes and methods of manufacture; the composition and source of airborne effluents; rate and period of emissions; and such other information as the commission may prescribe.

Section 11. Permits may be required.—The commission may adopt rules and regulations making it unlawful for any person to construct, alter, expand, or operate any installation or plant which, through its operation or maintenance, may emit, discharge or permit to escape pollutants or contaminants into the air, water, soil or property without first obtaining a permit from the environmental director as may be provided by such rules and regulations. Commencing construction or operation under such permit to construct or to operate shall be deemed acceptance of all of the conditions so specified.

Section 12. Sampling and testing.—Any person who may be responsible for the emission of air, water or noise pollution from any source shall, upon request of the environmental director, provide in connection with such sources and related source operations, such sampling and testing facilities exclusive of instruments and sensing devices as may be necessary for the proper determination of the nature, extent, quantity and degree of such pollution. The environmental director may also require the person responsible for the source of contaminants to conduct tests which will show the contaminant emissions from the source and to provide the results of said tests to the environmental director. These tests shall be carried out under the supervision of the environmental director or his designated representative and at the expense of the person responsible for the source of contaminants.

Section 13. Open burning prohibited.—No person shall ignite, cause to be ignited, permit to be ignited, or suffer, allow or maintain any open burning except:

(1) Fires used only for noncommercial cooking of food 'or human beings or for recreational purposes.

(2) Any fire set or permitted by any public officer in the performance of official duty, if such fire is set or permission given for the purpose of weed abatement, the prevention of a fire hazard, including the disposal of dangerous materials where there is no safe alternate method of disposal, or in the instruction of public employees in the methods of fighting fires, which fire is, in the opinion of such official, necessary.

(3) Fires set for the purpose of instruction in the methods of fighting fires, provided prior permission has been granted by a public officer in the performance of official duty.

(4) Fires intended for the reduction on premises and by the occupation thereof, of domestic rubbish originating solely within any building or structure used primarily for dwelling purposes and containing three (3) or less dwelling units, provided a municipal, county, or commercial refuse collection service is not available on a systematic basis, or at least once a week, further provided that the burning does not produce smoke, soot, odors, visible emission, heat, flames, radiation, or other conditions to such a degree as to create a nuisance. A campfire or other fire will be allowed that is used solely for recreational purposes, for ceremonial occasions, for outdoor noncommercial preparation of food, or on cold days, for warming of outdoors workers, as long as excessive visible emissions are not emitted.

(5) Fires otherwise permitted by rule of the Commission.

Section 14. Section 14 repealed (Chapter 73-496, Laws of Florida).

Section 15. Violations; notice; citations.—Whenever evidence has been obtained or received establishing that a violation of this act or any rules or regulations adopted pursuant to this act has been committed, the environmental director shall issue a notice to correct the violation or a citation to cease the violation, and cause the same to be served upon the violator by personal service or certified mail or by posting a copy in a conspicuous place on the premises of the facility causing the violation. Such notice or citation shall briefly set forth the general nature of the violation and specify a reasonable time within which the violation shall be rectified or stopped, commensurate with the circumstances. If the violation is not corrected within the time so specified, or the violation stopped, or reasonable steps taken to rectify the violation, the environmental director shall have the power and authority to issue an order requiring the violator to cease or suspend operation of the facility causing the violation until the violation has been corrected, or the environmental director may institute action to compel compliance with the provisions of such notice or citation, and/or initiate proceedings to prosecute the violator for violation of this act.

Section 16. Emergency order; penalties.—In the event a violation of this act or the rules and regulations promulgated pursuant to this act creates an immediate health hazard or threatens immediate serious damage to the public health, or threatens or causes irreparable injury or damage to aquatic life or property, the environmental director shall have the power and authority to order immediate cessation of the operations causing such conditions. Any person receiving such an order for cessation of operations shall immediately comply with the requirements thereof. It shall be unlawful for any person to fail or refuse to comply with an emergency order issued and served under the provisions of this section.

Section 17. Nuisances prohibited.—No person shall cause, let, permit, suffer or allow any emission or discharge into the atmosphere or waters of any substance or thermal energy, or commit any act, which may cause injury, detriment or public nuisance to any person or the public or which endangers the comfort, repose, health or safety of any person or the public, or which causes or may reasonably be expected to cause injury or damage to business, vegetation or animals. Each day such violation exists shall constitute a separate offense.

Section 18. Prohibitions, violation, penalty, intent.

(1) It is unlawful for any person:

(a) To cause or to take such action as may reasonably be expected to cause air, water or noise pollution in Hillsborough County, or to otherwise violate any other provision of this act, or any rules adopted by the commission pursuant to this act.

(b) To violate or fail to comply with any order of the director or commission, including orders or rules fixing standards for noise, or air or water quality.

(2) Violation is punishable by a civil penalty of not more than $5,000 for the first offense and of not more than $5,000 for each offense thereafter. Each day during any portion of which such violation occurs constitutes a separate offense. Failure of any offender to pay any fine imposed under this section within a time set by the court when imposing said fine shall be evidence of an intent to violate orders of the commission and shall enable the court to enter an order for the offender to cease from doing business or carrying on operations within Hillsborough county.

(3) Violation of any provision of this act or any order, rule, regulation or permit issued pursuant to its authority is a misdemeanor of the second degree, punishable as provided in Florida Statutes, Chapter 775.082 or 775.083.

(4) It is the legislative intent that the civil and criminal penalties and fines imposed by the court be of such amount as to insure immediate and continued compliance with this act and rules and regulations pursuant thereto.

Section 19. Enforcement; procedure; remedies; proceedings for injunction.

The following remedies shall be available for violation of this chapter:

(1) Judicial remedies:

(a) The commission may institute a civil action in a court of competent jurisdiction to establish liability and to recover damages for any injury to the air, waters, or property, including animal, plant and aquatic life caused by any violation; and

(b) The commission may institute a civil action in a court of competent jurisdiction to impose and to recover a civil penalty for each violation in an amount of not more than $5,000 per offense, provided, that the court may receive evidence in mitigation. Each day during any portion of which such violation occurs constitutes a separate offense.

(c) It shall not be a defense to or ground for dismissal of these judicial remedies for damages and civil penalties that the commission has failed to exhaust all administrative remedies, has failed to serve notice of violation or has failed to hold an administrative hearing prior to the institution of a civil action.

(2) Administrative remedies:

(a) The director may institute an administrative proceeding before the commission to establish liability and to recover damages for any injury to the air, waters, or property, including animal, plant, or aquatic life caused by any violation. After a hearing the violator may be ordered to pay a specified sum as damages. Judgment upon the amount of damages may be entered in any court having jurisdiction thereof and may be enforced as any other judgment. Parties to an administrative proceeding for damages shall be afforded all rights of discovery permitted by the Florida rules of civil procedure, and appropriate orders may be issued to effectuate the purposes of discovery.

(b) An administrative proceeding for abatement, prevention, or control of violations, or for restoration, may be instituted by service by the director of a written notice of violation upon the alleged violator by personal service or certified mail or by posting a copy in a conspicuous place on the premises of the violation. The notice shall specify the provision of the law, rule, regulation, permit, certification, or order of the commission or director alleged to be violated and a summary of the facts alleged to constitute a violation thereof. Such written notice may provide that the alleged violator cease the violation. An order for restoration or other corrective action may be included in the notice, provided that no order of restoration shall become effective until after service and an administrative hearing, before the hearing officer, if requested within twenty (20) days after service of the notice. Failure to request an administrative hearing within the specified time period shall constitute a waiver thereof. Further conduct, procedure, discovery, and pleadings for the administrative proceeding shall be as provided by this act or the rules and regulations of the commission.

(3) Nothing herein shall be construed as preventing any other legal or administrative action in accordance with law or this act.

(4) Every order of the commission is legally enforceable, binding and reviewable only in accordance with the administrative procedure act, chapter 120, part III, Florida Statutes.

(5) The commission may institute a civil action in a court of competent jurisdiction to seek injunctive relief to enforce compliance with this chapter or any rule, regulation, permit, certification, or order, to enjoin any violation specified in section 17 or section 18(1), and to seek injunctive relief to protect or restore the air, waters, and property, including animal, plant and aquatic life from injury caused or threatened by any violation.

(6) All the judicial and administrative remedies in this section and section 15, as amended, are independent and cumulative except that the judicial and administrative remedies to recover damages are alternative and mutually exclusive.

Section 19A. Additional civil liability; assessment of damages; joint and several liability; pollution recovery fund.—

(1) Whoever causes air, water or noise pollution or damage to the animal, or plant life of Hillsborough county, or other damage to said air or waters is liable for such damages and the reasonable costs and expenses of the county or commission incurred in tracing the source of the pollution or damage and in restoring the air or waters or plant or animal communities to their former condition.

(2) Upon the request of the environmental director or any proper county officer or agency or the alleged violator, the commission may consider and assess these damages. If the amount so assessed is not paid within a reasonable time as prescribed by the commission, the commission may institute civil action in the appropriate court for a judicial determination of liability and damages.

(3) Nothing herein shall give the commission the right to bring an action on behalf of any private person. Nothing herein shall prohibit the commission from proceeding forthwith to obtain a judicial determination of the liability and damages. No finding, written report or recommendation of the commission made pursuant to this section shall be admissible in evidence in any action.

(4) Whenever two or more persons cause air, water or noise pollution in violation of this chapter or any rule, regulation or order of the commission, or otherwise violate this act, so that the damage is indivisible, each violator shall be jointly and severally liable for such damage and for the reasonable cost and expenses incurred in tracing the source of discharge or damage, in controlling and abating the source and the pollutants, and in restoring the air, waters, and property, including the animal, plant, and aquatic life to their former condition; provided, however, that if said damage is divisible and may be attributed to a particular violator or violators, each violator is liable only for that damage attributable to his violation.

(5) There is hereby created a pollution recovery fund which is to be supervised and used by the commission to restore polluted areas of the county, as defined by the commission, to the condition they were in before pollution occurred. The fund shall consist of all moneys recovered by the commission or director in an action against any person who has polluted or engaged in activity in violation of this act or any activity tending to pollute the air, soil or water of the county. The moneys, excluding recovered costs and expenses, shall be disbursed first to pay all amounts necessary to restore the respective polluted areas which were the subjects of commission action. Recovered cost and expenses may be used by the commission in any manner as may advance its purposes set forth herein. Any moneys remaining in the fund shall then be used by the commission, as it sees fit, to pay for any work needed to restore areas which require more money than the commission was able to obtain by court action or otherwise or to restore areas in which the commission brought suit but was unable to recover any moneys from the alleged violators.

Section 20. Appropriations—The board of county commissioners of Hillsborough county shall annually appropriate sufficient moneys as they shall deem appropriate to carry out the purposes of this act. In making such appropriations and in expending such funds, the board of county commissioners shall not be limited by the provisions of section 7, chapter 22323, Laws of Florida; section 1 chapter 57-1391, Laws of Florida, and section 1, chapter 63-1391, Laws of Florida. The appropriation, budgeting and expenditure of such funds is hereby declared to be for a public purpose. The commission may also accept any grant or donation for the purposes of this law.

Section 21. Construction of act.—The provisions of this act shall be liberally construed in order to effectively carry out the purposes of this act in the interest of the public health, safety and general welfare; provided the provisions of this act are not intended and shall not be construed as superseding or conflicting with any statutory provisions relating to, or rules and regulations promulgated by, the Florida state board of health, and the Florida department of pollution control, but shall be construed as implementing and assisting the enforcement thereof.

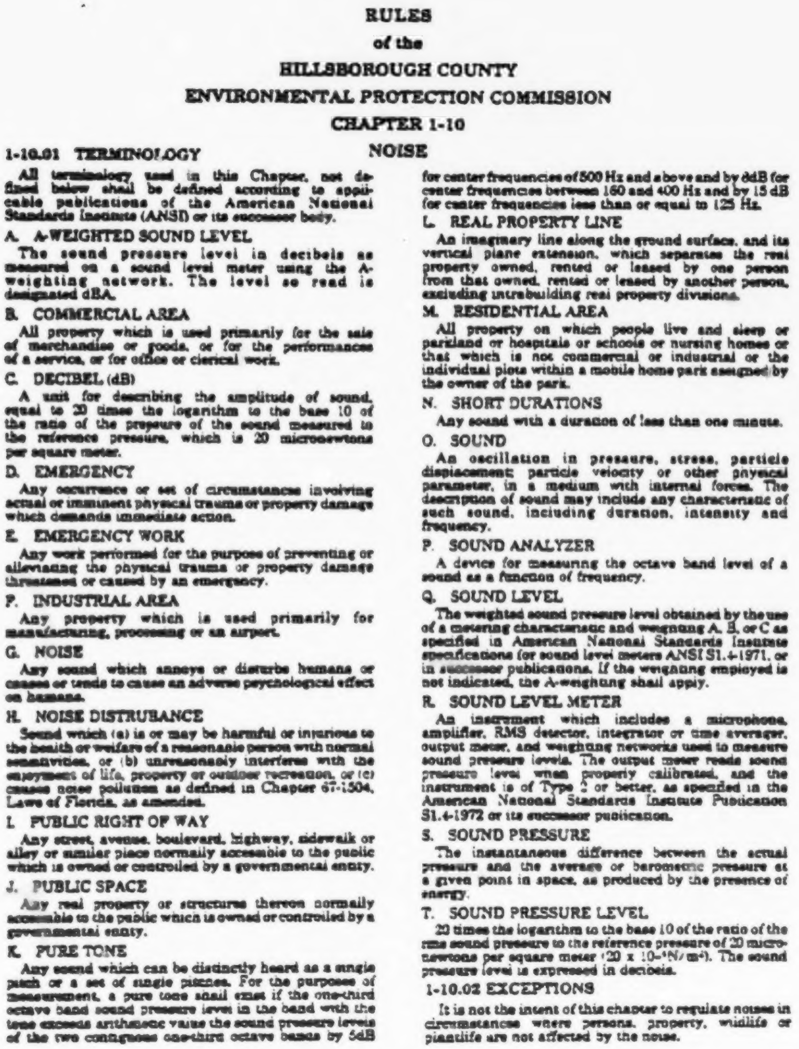
Section 22. Consolidation of governments.—In the event of the consolidation of the governments of the city of Tampa and Hillsborough county, all powers, functions, duties, responsibilities, obligations, and properties of the commision shall be transferred to and vested in the legislative branch of such consolidated government automatically by operation of law.

Section 23. Severability.—It is declared to be the legislative intent that, if any section, subsection, sentence, clause or provision of this act is held invalid, the remainder of the act shall not be affected.

Section 24. Effective date.—This act shall become effective October 1, 1967.

Became a law without the Governor's approval.

Filed in Office Secretary of State August 4, 1967.



RULES
of the
HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION COMMISSION
CHAPTER 1-10
NOISE

1-10.01 TERMINOLOGY

All terminology used in this Chapter, not defined below shall be defined according to applicable publications of the American National Standards Institute (ANSI) or its successor body.

A. A-WEIGHTED SOUND LEVEL

The sound pressure level in decibels as measured on a sound level meter using the A-weighting network. The level so read is designated dBA.

B. COMMERCIAL AREA

All property which is used primarily for the sale of merchandise or goods, or for the performances of a service, or for office or clerical work.

C. DECIBEL (dB)

A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the prepsure of the sound measured to the reference pressure, which is 20 micronewtons per square meter.

D. EMERGENCY

Any occurrence or set of circumstances involving actual or imminent physical trauma or property damage which demands immediate action.

E. EMERGENCY WORK

Any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

F. INDUSTRIAL AREA

Any property which is used primarily for manufacturing, processing or an airport.

G. NOISE

Any sound which annoys or disturbs humans or causes or tends to cause an adverse psychological effect on humans.

H. NOISE DISTRUBANCE

Sound which (a) is or may be harmful or injurious to the health or welfare of a reasonable person with normal sensitivities, or (b) unreasonably interferes with the enjoyment of life, property or outdoor recreation, or (c) causes noise pollution as defined in Chapter 67-1504, Laws of Florida, as amended.

I. PUBLIC RIGHT OF WAY

Any street, avenue, boulevard, highway, sidewalk or alley or similar place normally accessible to the public which is owned or controlled by a governmental entity.

J. PUBLIC SPACE

Any real property or structures thereon normally accessible to the public which is owned or controlled by a governmental entity.

K. PURE TONE

Any sound which can be distinctly heard as a single pitch or a set of single pitches. For the purposes of measurement, a pure tone shall exist if the one-third octave band sound pressure level in the band with the tone exceeds arithmetic value the sound pressure levels of the two contiguous one-third octave bands by 5dB for center frequencies of 500 Hz and above and by 8dB for center frequencies between 160 and 400 Hz and by 15 dB for center frequencies less than or equal to 125 Hz.

L. REAL PROPERTY LINE

An imaginary line along the ground surface, and its vertical plane extension, which separates the real property owned, rented or leased by one person from that owned, rented or leased by another person, excluding intrabuilding real property divisions.

M. RESIDENTIAL AREA

All property on which people live and sleep or parkland or hospitals or schools or nursing homes or that which is not commercial or industrial or the individual plots within a mobile home park assigned by the owner of the park.

N. SHORT DURATIONS

Any sound with a duration of less than one minute.

O. SOUND

An oscillation in pressure, stress, particle displacement, particle velocity or other physical parameter, in a medium with internal forces. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

P. SOUND ANALYZER

A device for measuring the octave band level of a sound as a function of frequency.

Q. SOUND LEVEL

The weighted sound pressure level obtained by the use of a metering characteristic and weighting A, B, or C as specified in American National Standards Institute specifications for sound level meters ANSI S1.4-1971, or in successor publications. If the weighting employed is not indicated, the A-weighting shall apply.

R. SOUND LEVEL METER

An instrument which includes a microphone, amplifier, RMS detector, integrator or time averager, output meter, and weighting networks used to measure sound pressure levels. The output meter reads sound pressure level when properly calibrated, and the instrument is of Type 2 or better, as specified in the American National Standards Institute Publication S1.4-1972 or its successor publication.

S. SOUND PRESSURE

The instantaneous difference between the actual pressure and the average or barometric pressure at a given point in space, as produced by the presence of energy.

T. SOUND PRESSURE LEVEL

20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference pressure of 20 micronewtons per square meter (20 x 10^{-6}N/m^{2}). The sound pressure level is expressed in decibels.

1-10.02 EXCEPTIONS

It is not the intent of this chapter to regulate noises in circumstances where persons, property, wildlife or plantlife are not affected by the noise.

The following activities or sources are exempt from the requirements of this chapter:

A. Emergencies

The emission of sound for the purpose of alerting persons to the existence of an emergency, or in the performance of emergency work.

B. The unamplified human voice.

C. Reasonable operation of equipment or conduct of activities normal to residential or agricultural communities such as lawn care, soil cultivation, maintenance of trees, hedges and gardens, refuse collection, the use of lawn mowers, saws and tractors, street sweepers, mosquito fogging, tree trimming and limb chipping, and other normal community operations.

D. Cultural, ceremonial or traditional activities or events such as Gasparilla Day, parades, and Fourth of July demonstrations.

E. The lowing of cattle, the clucking of fowl, the neighing of horses, the baying of hounds and other normal sounds of reasonably cared for domestic animals.

1-10.03 PROHIBITED ACTS

A. NOISE DISTURBANCE PROHIBITED

No person shall make, continue, or cause to be made or continued, any noise disturbance.

1-10.04 SOUND LEVELS BY RECEIVING LAND USE

A. MAXIMUM PERMISSIBLE SOUND LEVELS BY RECEIVING LAND USE.

No person shall operate or cause to be operated any source of sound in such a manner as to create a sound level which exceeds the limits set forth for the receiving land use category in Table 1, when measured at or within the property line of the receiving land use.

Table 1.

SOUND LEVELS BY RECEIVING LAND USE

Receiving Land Use Category	Time	Sound Level Limit, dBA
Residential, Public Space, Agricultural or Institutional	7 A.M. — 10 P.M.	60
	10 P.M. — 7 A.M.	55
Commercial or Business	7 A.M. — 10 P.M.	65
	10 P.M. — 7 A.M.	60
Manufacturing or Industrial	At All Times	75

Adopted June 10, 1978
Revised April 13, 1978

B. CORRECTION FOR CHARACTER OF SOUND

For any source of sound which emits a pure tone, the maximum sound level limits set forth in Table I shall be reduced by 5 dBA. For any source of sound which is of short duration and is non-repetitive, the maximum sound level limits set forth in Table I shall be increased by 10 dBA from 7 A.M. to 10 P.M.

C. AIR CONDITIONING OR AIR-HANDLING EQUIPMENT

No person shall operate or cause to be operated any air conditioning or air-handling equipment in such a manner as to exceed any of the following sound levels across a residential real property line:

TABLE II

Measurement Location	dB(A)
Any point on neighboring property line	60
Center of neighboring patio	55
Outside the neighboring living area window nearest the equipment location	55

1-10.05 MOTOR VEHICLE

A. MOTOR VEHICLES OPERATING ON PUBLIC RIGHT OF WAY

Motor vehicles on a public right of way are regulated as set forth in the Florida Motor Vehicle Noise Prevention and Control Act of 1974, Chapter 74-110, Laws of Florida.

B. RECREATIONAL MOTORIZED VEHICLES OPERATING OFF PUBLIC RIGHTS OF WAY

No person shall operate or cause to be operated any recreational motorized vehicle off a public right of way in such a manner that the sound level emitted therefrom violates the provisions of Chapter 1-10.04(A). This section shall apply to all recreational motorized vehicles, whether or not duly licensed and registered, including, but not limited to motorcyles, go-carts, amphibious craft, campers and dune buggies. All such vehicles shall use noise attenuating devices (exhaust mufflers).

C. MOTOR VEHICLES OPERATED AT FACILITIES FOR COMPETITIVE EVENTS

1. All motor vehicles operated at facilities for competitive events are exempted from complying with Chapter 1-10.04(B).

2. Noise level shall not exceed 78 dBA when measured at or within the property line of residential properties.

3. Facilities for competitive events which might reasonably be expected to be a source of noise which exceeds the limits specified in Chapter 1-10.04(A) shall not operate between the hours of 11:30 P.M. and 12:00 noon.

4. Vehicles shall use noise attenuating devices (exhaust mufflers).

D. APPROVAL REQUIRED

No person shall construct, alter, expand or operate any installation or facility for competitive events, the use or operation of which might reasonably be expected to be a source of noise which exceeds the limits specified in Chapter 1-10.04(A), without first providing documentation and assurance of compliance with Chapter 1-10.05(C), and without first receiving written approval from the Environmental Director as provided for under Sections 10 and 11 of the Hillsborough County Environmental Protection Act.

The documentation and assurance above shall include but not be limited to, use of sound barriers, use of muffler devices, control of direction and volume of loud speakers and provisions for monitoring.

B.2.3 Complaint response procedure

a. After receiving a noise complaint, one of three people in the Complaints Department will investigate. All complaints are investigated or forwarded to the proper agency. In most cases, a problem can be corrected simply by notifying the responsible party. Simple problems, such as a noisy sewage lift station or a loud radio, are handled in this matter, and measurements are taken with a GenRad 1565-B.

b. If a problem is more severe, such as a noisy construction pump, a Notice of Alleged Violation will be issued to the responsible party citing the rules violated and directing the responsible party to take corrective action and respond in writing. Notices are usually issued in the field by the investigator.

c. If the noise problem is of greater magnitude and affects a large number of persons (i.e., race tracks), a Notice to Correct or Cease Violation will be issued to the responsible party. Notices are prepared by the Enforcement Department, reviewed by the Assistant County Attorney, and signed by the Environmental Director. All notices of violation are either sent by certified mail or hand-delivered to the responsible party and posted on the property.

d. Noise measurements taken for the preparation of a Notice to Correct or for possible court action will be taken with either a Columbia SPL 110 or a Metrosonics dB-602.

B.2.4 Previous noise laws

Prior to 1976, only nuisance provisions existed. When responding to complaints, however, a "proposed" property line limit was used, and some reduction of noise levels was achieved.

B.2.5 Events responsible for the present law

a. In 1972, the Florida Legislature amended the Hillsborough County Environmental Protection Act to include noise as a pollutant.

b. In June 1976, the Hillsborough County Environmental Protection Commission after several attempts, adopted Chapter 1-10, Noise. There were no specific noise problems leading to the adoption of the current law, just a general consensus among staff members that specific sound level standards were needed rather than trying to correct noise problems on the basis of nuisance provisions.

B.2.6 Instrumentation

a. Specific devices

- GenRad 1565-B Sound Level Meter: A-, B-, and C-weightings.
- Columbia SPL 110: A-, B-, and C-weightings; continuous monitoring with strip chart recorder.
- GenRad 1933 Precision Sound Level Meter and Analyzer: Octave bands; A-, B-, and C-weightings and flat response.

- Metrosonics dB-602 Sound Level Analyzer: A-weighting; integrating capabilities for any L_n plus computations for L_{eq} and L_{dn}; measures and records any selected four L_n.

b. The 1565-B and 1933 are used for property line measurement on first response to a complaint. The dB-602 is used for complaint response and for general ambient noise measurements. As a general rule, the Columbia is used in conjunction with the dB-602 to measure C-weighted noise since the dB-602 only produces results in A-weighted values.

B.2.7 Noise-related problems not dealt with by primary agency (Environmental Protection Agency)

Complaints about barking dogs, noisy parties, and general disturbances of the peace are a police matter.

B.2.8 Some problems with the current program

Present restrictions placed on motor vehicles operated at facilities for competitive events are alleged to be too restrictive. It is alleged that race car owners may refuse to race at the affected facilities if these restrictions are imposed.

B.2.9 Approximate annual program costs (1978)

a.	Salaries and benefits (four people, 10% to 35% full time)	$12,600
b.	Capital expenditures budgeted for FY '79	125
c.	Equipment maintenance budgeted for FY '79	1,000
		$13,725

B.2.10 Nonenforcement noise-related services

a. Noise surveys for HUD projects and for County Planning Commission.

b. Computation of property line noise levels that would result if proposed refrigeration/air-conditioning equipment were installed in certain commercial or apartment buildings. Computations performed at request of County Building and Zoning.

c. Recommendations given to an industry that asked what noise problems they might encounter if they located on a specific site.

d. Investigation of noise-related problems that might arise if Tampa General Hospital established a heliport for use in transporting emergency patients.

B.2.11 Other statistics

a. Population — 652,000.

b. Complaints received — 60 to 70 per year.

c. Commission does not handle complaints about barking dogs.

d. Percent of complaints for which noise measurements were made — 25%.

B.3 St. Louis County, Missouri — Department of Community Health and Medical Care

B.3.1 Description of laws

Title VI SLCRO 1964, Section 1, Chapter 625, Noise Control Code — Establishes sound level limits in terms of A-weighted sound levels that are permitted for specified periods of time. Sound levels are measured anywhere outside the noise source property line. Sound level limits depend upon land use and time of day, for example:

Residential Land Use — Daytime (7 a.m. to 10 p.m.)

Total permitted duration, in minutes, during a continuous 60-min period	A-weighted sound level
60	55 or less
30	56 - 58
15	59 - 61
8	62 - 64
4	65 - 67
2	68 - 70
0	71 or greater

Has corrections for pure tone and for impulsive noise.

Has appeal and variance procedures.

Code to be enforced by the Director of the Department of Community Health and Medical Care.

B.3.2. Copies of laws, St. Louis County

ST. LOUIS COUNTY
NOISE CONTROL CODE

OCTOBER 29, 1974

TABLE OF CONTENTS

Page

625.010 Citation of Chapter 1
625.020 Definitions 1
625.030 Scope 3
625.040 Applicability of Standards Established by A.N.S.I. 3
625.050 Permissible Noise Leves — Standards 3
625.060 Vibration Standards 6
625.070 Exceptions 6
625.080 Notice of Violation 6
625.090 Duties of the Board 7
625.100 Board to consider Appeal 7
625.110 Variances 8
625.120 Service of Notice 9
625.130 Disclosure of Secret Processes and Production Levels Prohibited 10
625.140 Disclosure of Secret Processes — Penalty 10
625.150 Regulations for Measurement Procedures 10
625.160 Enforcement, By Whom 10
625.170 Right of Entry 10
625.180 Penalties for Violation 10
625.190 Construction 10
625.200 Conflicting Laws 10

AN ORDINANCE

Amending Title VI, SLCRO 1964, as amended, by enacting and adding thereto a new chapter to be numbered 625, relating to the control of the emission of noise and the generation of vibrations within St. Louis County.

NOISE CONTROL CODE

SECTION 1. Title VI SLCRO 1964, as amended, is hereby amended by enacting and adding thereto a new Chapter to be numbered 625, entitled the "Noise Control Code", relating to the control of the emission of noise and the generation of vibrations within St. Louis County, said new chapter to read as follows:

625.010 CITATION OF CHAPTER. - This Chapter shall be cited as the "Noise Control Code".

625.020 DEFINITIONS. - For purposes of this Chapter the following words and phrases are herein defined:

1. **A-weighted Sound Pressure Level:** A weighted sound pressure level as measured with the A-weighting network of a sound level meter. The unit of measurement is dB(A).
2. **Ambient Noise Level:** The A-weighted sound pressure level of all the encompassing noise associated with a given environment, being usually a composite of sounds from many sources.
3. **A. N. S. I.:** The American National Standards Institute or its successor bodies.
4. **Board:** The Appeal Board established by Section 612.070 SLCRO 1964, as amended.
5. **Boundary:** The line of demarcation which separates the real property owned by one person from that owned by another person.
6. **Commercial Land Use Category:** Any activity which exists on or is applied to land or structures on the land wherein goods, services or commodities are provided, exchanged or purchased and sold at wholesale or retail. The commercial land use category shall include facilities for the repair or servicing of new and used automobiles, trucks, trailers, construction equipment, agricultural equipment and boats, and public or private utility facilities.
7. **Construction Activity:** Any or all activity necessary or incidental to the erection, demolition, assembling, repairing, altering, installing or equipping of public or private buildings, private or public parks, premises, utility lines, and private or public highways, roads or streets, including land clearing, grading, excavating and filling.
8. **Construction Device:** Any device used in construction including, but not limited to, any air compressor, pile driver, manual tool, bulldozer, pneumatic hammer, steam shovel, derrick, crane, steam or electric hoist.
9. **Daytime Hours:** 7:00 o'clock A.M. to 10:00 o'clock P.M., prevailing local time.
10. **Director:** The Director of the Department of Community Health and Medical Care or his duly authorized agents.
11. **Discrete Tone:** A noise measured on a one-third octave band analyzer which is 10 decibels greater than each of the adjacent one-third octave bands.
12. **Emergency Work:** Work necessary to restore property to a safe condition following a public calamity, or work required to protect person or property from an imminent exposure to danger.
13. **Emergency Signal Device:** Any gong, siren, whistle or any air horn or similar device when used on any vehicle designated as an emergency vehicle by ordinance or by Missouri statute, or used in connection with an emergency warning system, or used in connection with a warning system intended to produce a sound signal upon unauthorized entrance by a person into a building or motor vehicle.

14. **Heavy Industrial Land Use Category:** Any activity which exists on or is applied to land or structures on the land which pertains to: the mining or extraction of raw materials from the earth and the processing thereof, salvage yards, junk yards, steel mills, foundries, smelters, automobile, truck construction equipment or agricultural equipment assembly plants, sulphur plants, rubber reclamation plants, cement plants, sanitary landfills, railroad switching yards, metal fabrication plants and chemical processing plants.

15. **Impulsive Noise:** A noise, containing excursions usually of no more than one second, the A-weighted sound pressure level of which exceeds the ambient noise level by more than 20 dB(A), when measured by the fast meter characteristic of a sound level meter.

16. **Light Industrial Land Use Category:** Any activity which exists on or is applied to land or structures on the land wherein the activities of manufacturing, fabrication, processing or assembly are utilized to produce a semi-finished or finished product. The light industrial land use category shall include the warehousing, storing and distributing of semi-finished or finished products.

17. **Motor Vehicle:** Any self-propelled vehicle not operated exclusively on rails.

18. **Nighttime Hours:** 10:00 o'clock P.M., to 7:00 o'clock A.M., prevailing local time.

19. **Perception Threshold:** The minimum vibrational motion necessary to cause awareness of the existence of the vibration by direct means, including but not limited to, sensation by touch or visual observations. Any vibration which produces more than 0.05 inch/second Root Mean Square vertical velocity shall be deemed sufficient to cause the awareness of the existence of the vibration by direct means.

20. **Period of Measurement:** Any continuous sixty minute period during which observations of stationary noise sources are made and measurements of noise levels are taken.

21. **Person:** Any human being, firm, association, organization, partnership, business, trust, corporation, company, contractor, supplier, installer, user, owner, or operator and shall include any municipal corporation or its officers or employees.

22. **Residential Land Use Category:** Any activity which exists on or is applied to land or structures on the land wherein persons occupy single family or multiple family dwellings, or other structures containing units with facilities which are used or are intended to be used for living or sleeping and which may include facilities for cooking and eating. The residential land use category shall include schools, churches, hospitals, libraries, public or private parks and other similar land uses.

23. **Sound:** An audible oscillation of pressure in air.

24. **Sound Level Meter:** Any instrument including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of sound pressure levels in a specified manner which complies with Type 2 or better standards established in the A. N. S. I. S1.4-1971 "Specification for Sound Level Meters."

25. **Sound Pressure Level:** Twenty times the logarithm to the base 10 of the ratio of the Root Mean Square pressure of a sound to the standard reference pressure which is 20 micro Pascals. The unit of measurement is the decibel (dB).

26. **Stationary Noise Source:** Any equipment, motor vehicle, aircraft, or facility, fixed or movable, capable of emitting audible sound.

27. **Vehicular Way:** A paved or unpaved area used by motor vehicles including, but not limited to, roads, streets, highways, alleys and parking lots.

28. **Vibration:** A spatial oscillation of displacement, velocity or acceleration in a solid material.

625.030 SCOPE. — In order to enhance the public health and prevent the entrance of noise pollution and excessive vibrations into the atmosphere and environment of St. Louis County, which will tend to interfere with the health and welfare of the citizens of St. Louis County, the provisions of this Code shall be in effect in all unincorporated parts of St. Louis County and in all cities, towns, and villages within the corporate limits of St. Louis County except in those cities, towns, and villages with a population of 75,000 or over having an organized Health Department and which have adopted and are enforcing ordinances and resolutions pertaining to noise pollution and the generation of vibrations which have established standards that are no less stringent than the provisions set forth in this Chapter.

625.040 APPLICABILITY OF STANDARDS ESTABLISHED BY A. N. S. I. — Unless otherwise specified herein, or specified in regulations promulgated by the Director under this Code, the accoustical terminology, the reference pressure, instrument specifications, and calibrations and methods for measurement of sound pressure levels shall be in conformance with the definitions and provisions contained in the documents designated as A. N. S. I. S1.1-1971, S1.4-1971, S1.11-1966 (R 1971) and S1.13-1971, of which one copy of each document is filed in the office of the Administrative Director of St. Louis County, Missouri.

625.050 PERMISSIBLE NOISE LEVELS — STANDARDS.

1. No person shall operate or permit to be operated any stationary noise source which emits noise in such a manner that the level of the noise emitted, when measured at any point outside the boundary of the property upon which the stationary noise source is located using the slow meter characteristic and the A-weighting network of the sound level meter, exceeds the levels set forth in Table I below or exceeds the limit set forth in Section 625.050 (6). When the noise emitted is measured upon property which is located in a different land use category than the property upon which the stationary noise source is located, the levels applicable to the property where the noise emitted is measured shall be used to determine if a violation exists. If more than one use exists on the property where the noise emitted is measured such that more than one land use category would be applicable to the property, then the levels set forth in the least restrictive applicable land use category of Table I shall be used to determine if a violation exists.

2. If the stationary noise source emits noise containing a discrete tone, the permissible levels shall be 5dB lower than the applicable levels of Table I.

3. If the stationary noise source emits impulsive noise the levels of Table I shall be lowered by 5dB. A violation of this Code shall exist if the level of the impulsive noise emitted exceeds the applicable levels of Table I, as modified by this Subsection, when the measurement is made using the fast meter characteristic and the A-weighting network of the sound level meter or if the level of the impulsive noise emitted exceeds the limit set forth in Section 625.050(6).

4. In the event the stationary noise source emits impulsive noise containing a discrete tone, the modifications of Table I set forth in subsections (2) and (3) herein shall be cumulative.

5. If the ambient noise level exceeds the level of the noise emitted from the stationary noise source for one or more periods of time during the period of measurement, then for any such period of time the level of the noise emitted from the stationary noise source shall be deemed to be lower than the level which is permitted for sixty (60) minutes during the period of measurement in the applicable land use category and for the applicable time of day.

6. If, during the period of measurement, noise shall be emitted from a stationary noise source for periods of time at two or more different levels, a violation of this Code shall exist if the sum of the following fractions $\frac{C1}{T1} + \frac{C2}{T2} + \cdots + \frac{Cn}{Tn}$ exceeds the unit number 1. For purposes of this calculation Cn shall equal the actual time period that noise is emitted at each measured noise level and Tn shall equal the period of time that noise is permitted under Table I to be emitted at each measured noise level. Provided, however, if: (1) the ambient noise level exceeds the level of noise emitted from the stationary noise source for one or more periods of time during the period of measurement; or, (2) the level of the noise emitted from the stationary noise source is lower than the level of noise which is permitted in Table I for sixty (60) minutes during the period of measurement in the applicable land use category and for the applicable time of day for one or more periods of time during the period of measurement, then for the purpose of the calculation set forth in this subsection, for each such period of time, the term Cn shall be deemed to be zero (0) and the fraction $\frac{Cn}{Tn}$ shall be zero (0).

TABLE I

A. RESIDENTIAL LAND USE CATEGORY

DAYTIME HOURS

Tn — Total Duration of Time Noise Permitted to be Emitted from Noise Source Druing Period of Measurement (minutes)	A-Weighted Sound Pressure Level (dB(A))
60	55 or less
30	56-58
15	59-61
8	62-64
4	65-67
2	68-70
0	71 or greater

NIGHTTIME HOURS

60	50 or less
30	51-53
15	54-56
8	57-59
4	60-62
2	63-65
0	66 or greater

B. COMMERCIAL LAND USE CATEGORY

DAYTIME HOURS

Tn — Total Duration of Time Noise Permitted to be Emitted from Noise Source During Period of Measurement (minutes)	A-Weighted Sound Pressure Level (dB(A))
60	65 or less
30	66-68
15	69-71
8	72-74
4	75-77
2	78-80
0	81 or greater

NIGHTTIME HOURS

60	60 or less
30	61-63
15	64-66
8	67-69
4	70-72
2	73-75
0	76 or greater

C. LIGHT INDUSTRIAL LAND USE CATEGORY

ALL HOURS

Tn — Total Duration of Time Noise Permitted to be Emitted from Noise Source During Period of Measurement (minutes)	A-Weighted Sound Pressure Level (dB(A))
60	70 or less
30	71-73
15	74-76
8	77-79
4	80-82
2	83-85
0	86 or greater

D. HEAVY INDUSTRIAL LAND USE CATEGORY

ALL HOURS

Tn-Total Duration of Time Noise Permitted to be Emitted from Noise Source During Period of Measurement (minutes)	A-Weighted Sound Pressure Level (dB(A))
60	80 or less
30	81-83
15	84-86
8	87-89
4	90-92
2	93-95
0	96 or greater

625.060 VIBRATION STANDARDS. - No person shall cause or allow any operation nor engage in any activity causing vibrations to be generated which are greater than the perception threshold at any point outside of the boundary of the property where the source of the vibrations is located: provided, however, vibrations caused by blasting operations conducted in accordance with the requirements of Chapter 711, SLCRO 1964, as amended, The Explosives Code, shall not be subject to the provisions of this Section.

625.070 EXCEPTIONS. To the extent provided in this section the provisions of this Chapter shall not apply to:

1. The operation of construction devices, with sound control devices equivalent to or better than the original equipment, used in construction activities during daytime hours;

2. The repair, maintenance or construction of public facilities of the state, county or municipal governments, or such public or quasi-public municipal corporations as may be established under the constitution or laws of the State of Missouri;

3. Emergency work to repair or maintain private utility facilities;

4. Emergency work to repair equipment or facilities damaged or rendered inoperable as a direct result of unavoidable upset conditions providing such occurrence is reported to the Director within twenty-four (24) hours after the occurence;

5. The operation of motor vehicles on a vehicular way with sound control devices equivalent to or better than the original equipment;

6. The operation of railway equipment and vehicles operated exclusively on rails;

7. The in-flight operation of aircraft including the pre-takeoff run-up of aircraft engines; provided, however, with the exception of the pre-takeoff run-up of aircraft engines, the provisions of this Chapter shall apply to the run-up of aircraft engines, mounted or unmounted, for maintenance or test purposes during nighttime hours;

8. The necessary operation of emergency signal devices;

9. Electric power distribution transformers within a distance of fifty feet from the base of the support pole or from the fence line. In addition, electric power distribution transformers shall not be subject to the provisions of Section 625.050(2).

10. The operation of lawn care maintenance equipment with sound control devices equivalent to or better than original equipment from 7:00 A.M., prevailing local time to sunset.

625.080 NOTICE OF VIOLATION. — Whenever the Director determines that a violation of any provision of this Code exists, he shall issue a written notification to the person responsible for the alleged violation. The notification shall set forth the nature of the violation and shall direct that the violation must be abated within the time period specified by the Director, which time period shall not exceed 60 days from the date the notice is sent; provided, however, if the violation cannot be abated within the time period specified by the Director, the Director may extend the time period for compliance for a reasonable period of time upon submission of an acceptable abatement plan by the person responsible for the violation. In determining whether the abatement plan is acceptable, the Director's consideration shall include, but shall not be limited to:

(a) the sufficiency of all construction plans to reduce noise or vibration levels; and

(b) the sufficiency of the design criteria for any equipment changes to reduce noise or vibration levels; and

(c) the length of time necessary to perform all work to abate the violation.

625.090 DUTIES OF THE BOARD. — In addition to any other duties imposed by law or County ordinance, the duties of the Board shall include but shall not be limited to the following:

1. Review appeals from orders of the Director or from any other actions or determinations of the Director hereunder for which provision is made for appeal.

2. Grant, deny or revoke variance applications.

3. File an annual report with the County Council reviewing the activities of the Board together with recommendations concerning fees, variance applications, enforcement and procedures.

625.100 BOARD TO CONSIDER APPEAL. —

1. Any person aggrieved by any decision, ruling or order of the Director, may appeal to the Board. Appeals shall be taken within ten (10) days of the time the parties have been notified in writing of the Director's decision and the appeal shall act as a stay of the decision. Such notice of appeal shall be filed in writing with the Director and directed to the Board specifying the grounds therefor and the relief prayed for. The Director shall forthwith transmit to the Board all papers constitutiing the record upon which the decision, ruling or order appealed from is taken. The Board, upon hearing such appeal, shall either affirm, modify or set aside the decision, ruling, or order, but no action of the Board may be at variance with any of the provisions of this Code or any other ordinance of St. Louis County. Any final decision of the Board may be appealed by either party to the Circuit Court under provisions of the Missouri Administrative Procedure Act, Chapter 536, R.S.Mo. 1969.

2. Fifty Dollars ($50.00) shall accompany each Notice of Appeal which shall be paid to the Director for deposit with the County Treasurer.

3. Notice of a hearing held under Section 625.100 shall be given by the Director to the petitioner in writing at least seven (7) days prior to the date the hearing is set. Service of the notice shall be in accordance with Section 625.120 of this Code.

4. When the Board schedules a matter for hearing under Section 625.100, each party to the proceeding may file written arguments and may appear at the hearing in person or by representative with or without counsel, and may make oral arguments, offer testimony or cross examine witnesses, or take any combination of such actions.

5. The County Council may subpoena and compel the attendance of such witnesses as the Director or the party filing the appeal may designate and may require for examination the production of any books, papers, or records relating to the matter under investigation at the hearing.

6. All hearings held under Section 625.100 shall be held before a majority of all members of the Board and any final order or decision or other final action by the Board shall be approved by at least a majority of the Board's members hearing the matter.

7. The decision of the Board shall be in writing served and filed within fifteen (15) days after hearing and shall contain a brief statement of facts found to be true, the determination of the issues presented, and the order of the Board. A copy of the decision shall be served by the Director on the petitioner and to every person who has appeared as a party in person or by counsel at the hearing. Service shall be in accordance with Section 625.120 of this Code.

8. Upon application by the petitioner, at least five (5) days prior to the date of the hearing held under Section 625.100, the Chairman or any two members of the Board may grant a continuance of the hearing. A continuance may be granted without a meeting of the Board and without prior notice.

9. A summary record of the hearing held under Section 625.100 shall be kept by the Director and shall be made available to any party to the proceeding. Any party to the hearing may at his expense take and record a verbatim record of the proceedings.

10. The decision of the Board shall be effective ten (10) days after service on the petitioner unless otherwise provided by the Board.

625.110 VARIANCES.

1. The Board may grant individual variances beyond the sound pressure levels or vibration level limitations prescribed in this Code whenever it finds, upon presentation of adequate proof, that compliance with any provision of this Code will result in an arbitrary and unreasonable taking of property or in the practical closing and elimination of any lawful business, occupation or activity, in either case without sufficient corresponding benefit or advantage to the people; except that no variance shall be granted where the effect of the variance will permit the continuance of a health hazard; and except, also that any variance so granted shall not be construed as to relieve the person who received the variance from any liability imposed by other law for the commission or maintenance of a nuisance.

2. In determining under what conditions and to what extent a variance may be granted, the Board shall exercise a wide discretion in weighing the equities involved and the advantages and disadvantages to the applicant and to those affected by the noise and vibrations emitted by the applicant.

3. Variances shall be granted for such periods of time and under such terms and conditions as shall be specified by the Board in its order. The variance may be extended by affirmative action of the Board.

4. Any person seeking a variance shall do so by filing a petition for variance with the Director. The Director shall promptly investigate the petition and make a written recommendation to the Board as to the disposition thereof. Upon receiving the recommendation of the Director, the Board shall hold a public hearing in accordance with the procedures set forth in this Section.

5.

(a) Notice of public hearing shall be given by the Director to the petitioner in writing at least thirty (30) days prior to the date the hearing is set. Service of the notice shall be made in accordance with Section 625.120 of this Code.

(b) Notice of public hearing shall also be given by public advertisements setting forth the date, time and place of hearing. The Director shall include in such notice the name of the petitioner for the variance, the location of the premises for which the variance is sought, a brief description of the variance requested and the recommendation of the Director. The notice shall be published in a newspaper of general circulation in St. Louis County. Such publication shall take place for two (2) days within a four (4) day period and the second day of publication shall be at least thirty (30) days prior to the date the hearing is set. The cost of publication shall be borne by the petitioner, and shall be in addition to any charges imposed upon the petitioner under Section 625.110 (15) herein.

(c) The Director shall send a copy of the notice of public hearing to all persons who are not parties to the proceeding who have filed a written request for notification with the Director.

6. The Director shall maintain a copy of the recommendation at the offices of the Department of Community Health and Medical Care, and said recommendation shall be available for public inspection.

7. The County Council may subpoena and compel the attendance of such witnesses as the Director or the party requesting the variance may designate and may require for examination the production of any books, papers, or records relating to the matter under investigation at the hearing.

8. All hearings shall be held before a majority of all the members of the Board and any final order or decision or other final action by the Board shall be approved by at least a majority of the members of the Board hearing the matter.

9. At any public hearing, the Board shall maintain a record of the name and address of each witness appearing and all testimony taken before the Board shall be under oath and recorded stenographically. Copies of the transcript so recorded may be obtained by any member of the public or any party to the hearing upon payment of the usual charges therefor.

10. Upon application by the petitioner, at least five (5) days prior to the date of the hearing, the Chairman or any two members of the Board may grant a continuance of the hearing. A continuance may be granted without a meeting of the Board and without prior notice. Notice of a public hearing for which a continuance has been granted shall be given in accordance with the provisions of Section 625.110 (5).

11. At any public hearing held by the Board, the burden of proof shall be on the person petitioning for the variance. Each party to the proceeding may appear at the hearing in person or by representative, with or without counsel, and may make oral arguments, offer testimony or cross-examine witnesses, or take any combination of such actions. In addition any party to the proceeding or any person who may be directly affected by the subject matter thereof may submit, within seven (7) days subsequent to the hearings, written arguments setting forth their views.

12. The decision of the Board shall be in writing and filed within twenty-one (21) days after hearing and shall contain a brief statement of facts found to be true, the determination of the issues presented and the order of the Board. The decision of the Board shill be effective ten (10) days after service on the petitioner unless otherwise provided by the Board. The decision shall include a certification that the public hearing was held in accordance with the notice requirements of Section 612.110(5). Any final decision of the Board may be appealed by either party to the Circuit Court under provisions of the Missouri Administrative Procedure Act, Chapter 536 R.S.Mo. 1969.

13. A copy of the decision shall be served by the Director on the petitioner and to every person who has appeared as a party in person or by counsel at the hearing. Service shall be in accordance with Section 612.120 of this Code. In addition, any person making written request therefor shall be sent a copy of the decision of the Board.

14. Upon failure to comply with the terms and conditions of any variances specified by the Board, the variance may be revoked or modified by the Board after a public hearing held in accordance with the provisions set forth in this Section. Notice shall be served upon the person to whom the variance was granted and all persons who have filed with the Director a written request for notification.

15. Fifty Dollars ($50.00) shall accompany each request for variance which shall be paid to the Director for deposit with the County Treasurer.

625.120 SERVICE OF NOTICE.

1. Service of any written notice required by Sections 625.100 or 625.110 of this Code shall be made by registered or certified mail directed to the petitioner, his agent or attorney of record at the last known address, such service to be effective upon the date of service shown on the postal return receipt.

2. Service of any written notice required by this Code to be made on the Board of Director shall be by registered or certified mail addressed to the Director of the Division of Environmental Health, 801 South Brentwood, Clayton, Missouri 63105.

625.130 DISCLOSURE OF SECRET PROCESSES AND PRODUCTION LEVELS PROHIBITED. Information concerning secret processes or production levels which may be required, ascertained or discovered by the Director shall not be disclosed by the Director, except that the information may be disclosed by the Director if he is subpoenaed for the information or if in the course of a court proceeding or hearing the information is relevant to the proceeding or hearing.

625.140 DISCLOSURE OF SECRET PROCESSES — PENALTY. Any person who knowingly discloses any secret process or production level in violation of the provisions of Section 625.130 of this Code shall be punished by a fine of not more than One Thousand Dollars ($1,000.00) or by imprisonment in the County Jail for a term of one (1) year or by both such fine and imprisonment. Each disclosure shall constitute a separate offense.

625.150 REGULATIONS FOR MEASUREMENT PROCEDURES. The Director may, after public notice and opportunity for public hearing, promulgate regulations pertaining to the manner in which the measurement of sound pressure levels or vibration levels shall be performed. In determining the procedures to be used for the measurement of sound pressure levels or vibration levels the Director shall take into consideration the testing and measurement procedures of the A.N.S.I.

625.160 ENFORCEMENT, BY WHOM. The Director shall enforce the provisions of this Code.

625.170 RIGHT OF ENTRY. The Director, upon presentation of proper credentials, may enter at all reasonable times, upon any private or public property for the purpose of inspecting and investigating any condition or equipment he shall have cause to believe to be a source of noise exceeding the maximum levels or source of vibration exceeding the maximum level permitted by the provisions of this Code. If entry is refused, the Director shall notify the County Counselor of such fact and request that a warrant to search the premises believed to be in violation be obtained from the appropriate Magistrate.

625.180 PENALTIES FOR VIOLATION.

1. Any person convicted of violating any provision of this Code shall be punished by a fine of not more than One Thousand Dollars ($1,000.00) or by imprisonment in the County Jail for a term not to exceed one (1) year or both such fine and imprisonment.
2. The County Counselor shall be empowered to seek equitable relief in the Circuit Court to require the person in violation of the provisions of this Code to comply with the standards set forth in this Code.
3. Each day upon which any violation of this Code takes place shall constitute a separate offense.

625.190 CONSTRUCTION. This Code shall be liberally construed for the protection of health, safety and welfare of the people of St. Louis County.

625.200 CONFLICTING LAWS. Nothing herein contained shall be deemed to amend or nullify any provision of any other ordinance of St. Louis County, Missouri.

ST. LOUIS COUNTY NOISE CONTROL ORDINANCE PRIOR TO THE ONE ADOPTED IN 1974

1003.163 Zoning Performance Standard Regulations. — 1. This section contains the Zoning Performance Standard Regulations for St. Louis County. These regulations apply to the land uses and developments hereinafter indicated.

2. Performance Standards shall apply to any land use or development listed as a Permitted or Conditional Use in the regulations appearing in Sections 1003.141, 1003.143, 1003.145, 1003.151, 1003.153, and 1003.155 of this Chapter, for and within the "C-6", "C-7", "C-8", "M-1", "M-2", and "M-3" Districts.

3. Performance Standards:

(1) Vibration: Every use shall be so operated that the maximum ground vibration generated is not perceptible without instruments at any point on the lot line of the lot on which the use is located, except that vibration caused by blasting conducted in accordance with the requirement of the Explosives Code, Chapter 711, may exceed these limitations.

(2) Noise: Every use shall be so operated that the pressure level of sound or noise generated, measured in decibels, shall not exceed, at any point on the lot line, the maximum decibel levels for the designated octave band as set forth in the following table for the appropriate area:

	Maximum Permitted Sound Pressure Level in Decibels	
Octave Band Cycles Per Second	Within or Adjacent to "R" Residence Districts	Within All Other Areas
0 to 75	72	79
75 to 150	67	74
150 to 300	59	66
300 to 600	52	59
600 to 1200	46	53
1200 to 2400	40	47
2400 to 4800	34	41
above 4800	32	39

B.3.3 Complaint response procedure

a. When a complaint is received by the Department, usually by phone, the normal procedure is to obtain as much information from the caller as possible. Information obtained includes their name, address, phone number, the source of the noise, and the time that the noise is usually emitted.

b. An on-sight investigation is conducted at the source of the complaint. In most instances, source noise levels are measured.

c. If the noise levels are not in violation of the ordinance, the complainant is contacted and informed of the findings. If the noise exceeds the levels permitted in the ordinance, the responsible party is contacted either in person or by phone and informed of the complaint, the existence of a noise violation, and that a solution to the problem will be required. They are also informed that a written notice will be sent to them.

d. The written notice will specify the levels of noise measured, the location where the measurements were made, the dates and times of the measurements, and will reference relevant sections of the ordinance. The notice will also inform the recipient that an acceptable abatement plan and time schedule for compliance must be received by the Department within a specified time period. It will also state that he may appeal the directive within ten days after receipt of the notice. All notices are sent by certified mail.

e. If the violator agrees to correct the problem, additional measurements are made after the corrective work has been completed.

f. If the violator elects to appeal the order, he may do so by submitting a written Notice of Appeal to the Appeal Board Chairman, specifying the grounds for appeal and the relief requested. Upon receipt of the appeal, the Appeal Board will set a date and time for the appeal hearing. Fifty dollars must accompany each Notice of Appeal.

g. After the hearing, the final decision of the Board may be appealed to the Circuit Court either by those accused of the violation, or by the Department.

h. The Board may also grant individual variances above the sound levels prescribed in the code, but no variance shall be granted where the effect of the variance will permit the continuance of a health hazard.

B.3.4 Previous noise laws

Prior to 1974, noise performance standards existed in the laws enforced by the Zoning Department. This law contained maximum permitted sound pressure levels by octave band that applied at any point on the noise source lot line.

B.3.5 Events responsible for the present law

a. The noise control program in St. Louis County began in early 1971. Noise complaints to the County Council and to the Health Department prompted the start of the program. At that time, the County had an ordinance that was under the authority of the Zoning Department. The ordinance was very weak and vague and almost impossible to enforce. It apparently had never been used as an enforcement tool for noise abatement.

b. The complaints continued to increase, and for two years the Zoning Department attempted to respond to them. It became obvious that a more exact program of operation was necessary if the growing number of complaints were to be resolved effectively. The County Council agreed that a new ordinance was necessary and recommended that enforcement be controlled by the Health Department rather than by Zoning.

c. The ordinance took one full year to draft. Many meetings were held. Attending the meetings were people from industry, EPA officials, acoustical consultants, and attorneys. Some of the industries represented at the meetings were Monsanto, Ralston Purina, Lever Brothers, McDonnell Douglas, Chrysler Corporation, and Union Electric. The meetings were difficult and time consuming for all, but many issues were finally resolved, including selection of and agreement upon the sound level limits that would be specified in the code.

B.3.6 Instrumentation and measurement

Because St. Louis County's law establishes sound level limits in terms of level and duration, instrumentation has been acquired and techniques developed that permit measurement of both levels and durations. The basic technique involves use of a portable graphic level recorder, together with a sound level meter. The equipment is set up to measure the alleged violation. As the graphic level trace of the noise is made, it is annotated by the inspector. The annotations tell what levels are produced by the alleged violating noise source, and what levels are produced by other sources. The graphic level trace permits easy determination of both levels and durations, and convincingly demonstrates whether or not a violation exists.

Instrumentation owned by the Department includes:

a. Two GenRad Sound Level Meters: Type 1565-B; A-, B-, and C-weighting Type 2 Meter.

b. Two GenRad Sound Level Calibrators, Type 1567.

c. Bruel & Kjaer Impulse Precision Sound Level Meter: Type 2204; A-, B-, C-, D-, and linear-weighting Type 1 Meter.

d. Bruel & Kjaer Pistonphone Calibrator, Type 4220.

e. Bruel & Kjaer Outdoor Condenser Microphone, Type 4161.

f. Bruel & Kjaer Octave Filter Set, Type 1613.

g. Bruel & Kjaer One-third Octave Filter Set, Type 1616.

h. Bruel & Kjaer Level Recorder, Type 2305.

i. Bruel & Kjaer Portable Graphic Level Recorder, Type 2306.

j. Bruel & Kjaer Statistical Distribution Analyzer, Type 4420.

k. Nagra IV-SH Scientific Tape Recorder.

l. Two E.F. Johnson Company UHF-FM Hand Transceivers, 4 Watts RF power.

B.3.7 Noise-related problems not dealt with by primary agency (Department of Community Health and Medical Care)

Complaints about barking dogs referred to police department.

B.3.8 Approximate annual program costs (1978)

a.	Salaries and benefits (two people, each at least 50% full time)	$22,000
b.	New equipment	4,000
c.	Other costs (equipment repair, office supplies, etc.)	2,200
		$28,000

B.3.9 Nonenforcement noise-related services

The Department will occasionally make noise measurements in industrial facilities to help determine whether OSHA requirements are met.

B.3.10 Other statistics

a. Population — 1,000,000.

b. Complaints received — 30 to 40 per year.

c. Department does not handle complaints about barking dogs.

d. Percent of complaints for which noise measurements were made — 40%.

B.4 San Diego, California — Department of Building Inspection

Note: A detailed description of San Diego's noise control program can be found in "San Diego, California — Case History of a Municipal Noise Control Program," published by the EPA, November 1978, under contract EPA-68-01-3845. What follows are brief descriptions of the aspects of the San Diego program that contributed most to this study.

B.4.1 Description of laws

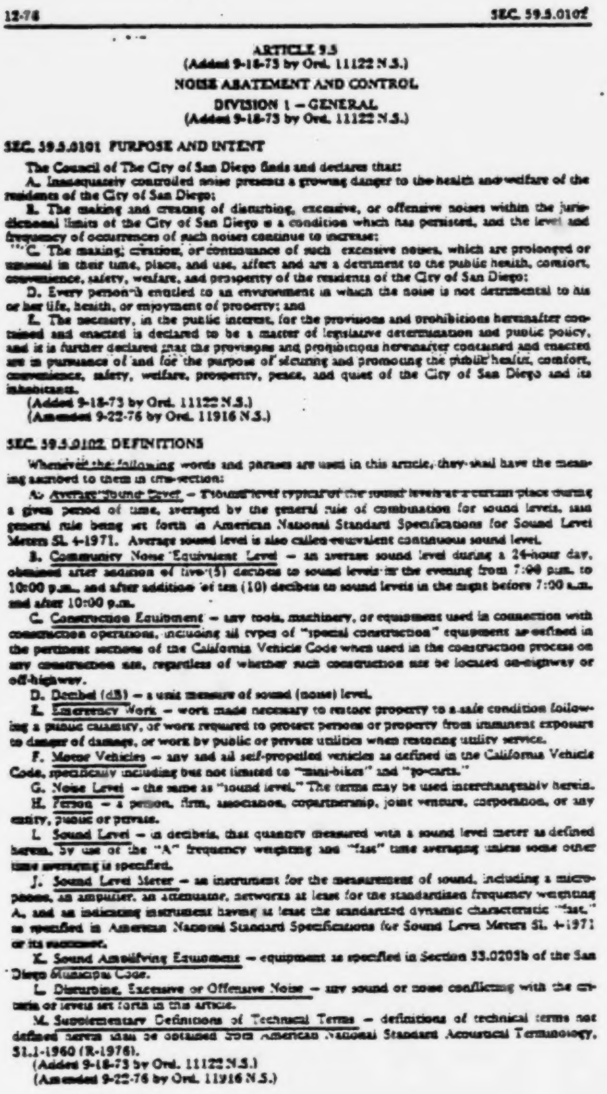
Article 9.5. Noise Abatement and Control – Establishes Noise Abatement and Control Administration and specifies duties and responsibilities of the Administrator. Establishes sound level limits in terms of 1-hr, A-weighted average sound levels [i.e., equivalent sound level, $L_{eq}(1)$]. Sound levels are measured at any location on or beyond the noise source property line. Limits depend upon land use zone and time of day, for example:

Residential (R-1)	50 dB	7 a.m. to 7 p.m.
	45 dB	7 p.m. to 10 p.m.
	40 dB	10 p.m. to 7 a.m.

Also places restrictions on motor vehicles, construction activities, refuse vehicles, and parking lot sweepers. Defines and prohibits disturbing, excessive, and offensive noises.

Contains permit, variance, and appeal provisions.

B.4.2 Copies of law, San Diego, CA



12-76 SEC. 59.5.0102

ARTICLE 9.5
(Added 9-18-73 by Ord. 11122 N.S.)

NOISE ABATEMENT AND CONTROL

DIVISION 1 – GENERAL
(Added 9-18-73 by Ord. 11122 N.S.)

SEC. 59.5.0101 PURPOSE AND INTENT

The Council of The City of San Diego finds and declares that:

A. Inadequately controlled noise presents a growing danger to the health and welfare of the residents of the City of San Diego;

B. The making and creating of disturbing, excessive, or offensive noises within the jurisdictional limits of the City of San Diego is a condition which has persisted, and the level and frequency of occurrences of such noises continue to increase;

C. The making, creation, or continuance of such excessive noises, which are prolonged or unusual in their time, place, and use, affect and are a detriment to the public health, comfort, convenience, safety, welfare, and prosperity of the residents of the City of San Diego;

D. Every person is entitled to an environment in which the noise is not detrimental to his or her life, health, or enjoyment of property; and

E. The necessity, in the public interest, for the provisions and prohibitions hereinafter contained and enacted is declared to be a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, comfort, convenience, safety, welfare, prosperity, peace, and quiet of the City of San Diego and its inhabitants.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0102 DEFINITIONS

Whenever the following words and phrases are used in this article, they shall have the meaning ascribed to them in this section:

A. Average Sound Level – the sound level typical of the sound levels at a certain place during a given period of time, averaged by the general rule of combination for sound levels, said general rule being set forth in American National Standard Specifications for Sound Level Meters S1.4-1971. Average sound level is also called equivalent continuous sound level.

B. Community Noise Equivalent Level – an average sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m., and after addition of ten (10) decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

C. Construction Equipment – any tools, machinery, or equipment used in connection with construction operations, including all types of "special construction" equipment as defined in the pertinent sections of the California Vehicle Code when used in the construction process on any construction site, regardless of whether such construction site be located on-highway or off-highway.

D. Decibel (dB) – a unit measure of sound (noise) level.

E. Emergency Work – work made necessary to restore property to a safe condition following a public calamity, or work required to protect persons or property from imminent exposure to danger of damage, or work by public or private utilities when restoring utility service.

F. Motor Vehicles – any and all self-propelled vehicles as defined in the California Vehicle Code, specifically including but not limited to "mini-bikes" and "go-carts."

G. Noise Level – the same as "sound level." The terms may be used interchangeably herein.

H. Person – a person, firm, association, copartnership, joint venture, corporation, or any entity, public or private.

I. Sound Level – in decibels, that quantity measured with a sound level meter as defined herein, by use of the "A" frequency weighting and "fast" time averaging unless some other time averaging is specified.

J. Sound Level Meter – an instrument for the measurement of sound, including a microphone, an amplifier, an attenuator, networks at least for the standardized frequency weighting A, and an indicating instrument having at least the standardized dynamic characteristic "fast," as specified in American National Standard Specifications for Sound Level Meters S1.4-1971 or its successor.

K. Sound Amplifying Equipment – equipment as specified in Section 33.0203b of the San Diego Municipal Code.

L. Disturbing, Excessive or Offensive Noise – any sound or noise conflicting with the criteria or levels set forth in this article.

M. Supplementary Definitions of Technical Terms – definitions of technical terms not defined herein shall be obtained from American National Standard Acoustical Terminology, S1.1-1960 (R-1976).

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

179-1

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SEC. 59.5.0103 SOUND LEVEL MEASUREMENT

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0104 SEVERABILITY

(Added 9-18-83 by Ord. 11122 N.S.)
(Renumbered 9-22-76 by Ord. 11916 N.S. now Sec. 59.5.0607.)

DIVISION 2 – ADMINISTRATION

(Added 9-18-73 by Ord. 11122 N.S.)

SEC. 59.5.0201 ESTABLISHMENT OF NOISE ABATEMENT AND CONTROL ADMINISTRATOR

There is hereby established within the Building Inspection Department of The City of San Diego the function of Noise Abatement and Control Administration which shall be administered by the Noise Abatement Officer (hereinafter referred to as the "Administrator"). In the performance of such duties as may be established, the Administrator shall be required to possess sufficient background and ability as is set forth in the Manual of Class Specifications for The City of San Diego.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0202 DUTIES AND RESPONSIBILITIES OF THE ADMINISTRATOR

A. The Administrator and his staff have the responsibility of regulating and controlling the emission of all excessive or offensive noises within the City of San Diego and shall take such action, subject to the provisions of this article, as is reasonable and necessary to abate noise. The Administrator shall coordinate the activities of all City departments relating to noise control and reduction in those activities carried out by the various departments, including the Environmental Impact Report review process relating to noise pollution. The Administrator may exercise or delegate any of the functions, powers and duties vested in his office or in the administration of his office.

B. The Administrator is expressly charged:

1. To make any necessary investigations, inspections, or studies which, in his opinion, are necessary for the purpose of enforcing the provisions of this article or controlling or abating a disturbing, excessive or offensive noise. Information derived from noise studies shall be made available to the public upon request.

2. To institute necessary proceedings to prosecute violations of this article and to compel the prevention and abatement of disturbing, excessive, or offensive noise, and as further set forth in Division 6 of this article.

3. To grant or issue variances, permits, notices, or other matters required under the provisions of this article as will not be contrary to its intent or detrimental to the public health, safety, and general welfare of the citizens of the City of San Diego, when, due to special conditions, strict and literal interpretation and enforcement of the provisions of this article would result in unusual difficulties or unnecessary hardship or be inconsistent with the general purposes of this article. In granting any such variance or permit, the Administrator shall hold hearings and may impose such conditions as he deems necessary or desirable to protect the public health, safety, and general welfare in accordance with this article.

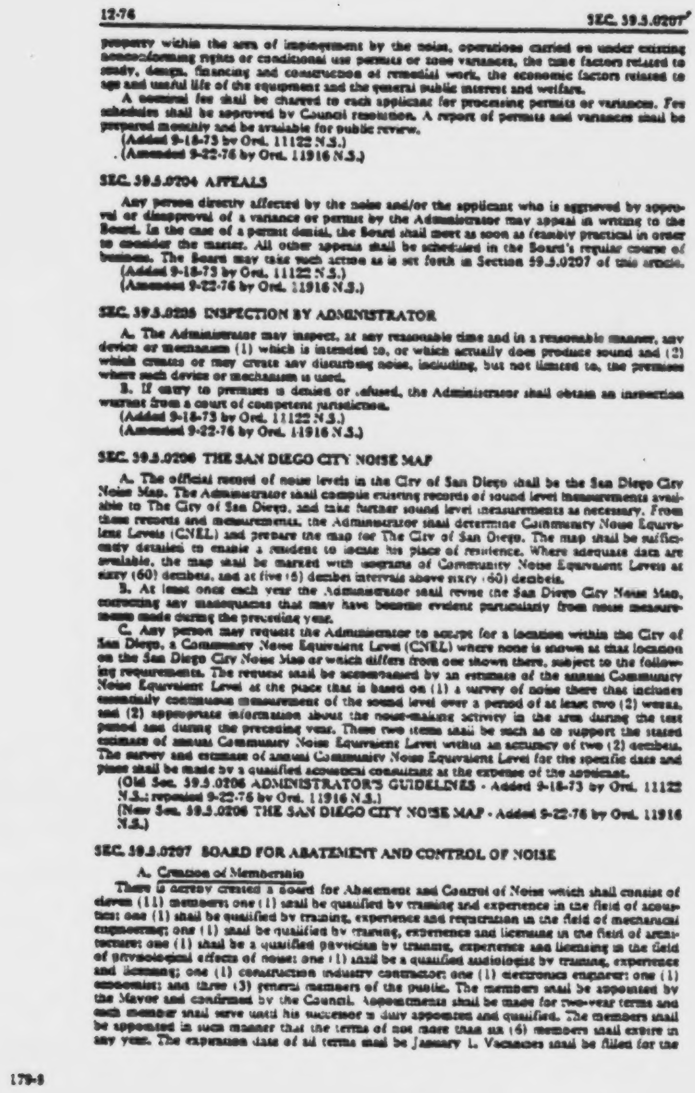
4. To do any and all other acts which may be necessary for the successful prosecution of the purposes of this article and such other acts as may be specifically enumerated herein as duties.

C. The Administrator may present to the Board for Abatement and Control of Noise (hereinafter referred to as the "Board"), as defined in Section 59.5.0207 of this article, for review and comment reports with specific recommendations for amendments to existing legislation, or for new legislation that is required to assure to the residents of the City of San Diego a quiet environment in accordance with this article.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0203 ISSUANCE OF PERMITS OR VARIANCES BY ADMINISTRATOR

The Administrator shall evaluate all applications for permits or variances from the requirements of this article and may grant said variances with respect to time for compliance, subject to such terms, conditions, and requirements as he or she may deem reasonable to achieving compliance with the provisions of this article. Each such variance shall set forth in detail the approved method of achieving compliance and a time schedule for its accomplishment. If in the judgment of the Administrator the time for compliance cannot be reasonably determined, a permit to cause the noise may be issued for a period not to exceed three (3) years. In determining the reasonableness of the terms of any proposed permit or variance, said Administrator shall consider the magnitude of nuisance caused by the offensive noise, the uses of



property within the area of impingement by the noise, operations carried on under existing nonconforming rights or conditional use permits or zone variances, the time factors related to study, design, financing and construction of remedial work, the economic factors related to age and useful life of the equipment and the general public interest and welfare.

A nominal fee shall be charged to each applicant for processing permits or variances. Fee schedules shall be approved by Council resolution. A report of permits and variances shall be prepared monthly and be available for public review.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0204 APPEALS

Any person directly affected by the noise and/or the applicant who is aggrieved by approval or disapproval of a variance or permit by the Administrator may appeal in writing to the Board. In the case of a permit denial, the Board shall meet as soon as feasibly practical in order to consider the matter. All other appeals shall be scheduled in the Board's regular course of business. The Board may take such action as is set forth in Section 59.5.0207 of this article.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0205 INSPECTION BY ADMINISTRATOR

A. The Administrator may inspect, at any reasonable time and in a reasonable manner, any device or mechanism (1) which is intended to, or which actually does produce sound and (2) which creates or may create any disturbing noise, including, but not limited to, the premises where such device or mechanism is used.

B. If entry to premises is denied or refused, the Administrator shall obtain an inspection warrant from a court of competent jurisdiction.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0206 THE SAN DIEGO CITY NOISE MAP

A. The official record of noise levels in the City of San Diego shall be the San Diego City Noise Map. The Administrator shall compile existing records of sound level measurements available to The City of San Diego, and take further sound level measurements as necessary. From these records and measurements, the Administrator shall determine Community Noise Equivalent Levels (CNEL) and prepare the map for The City of San Diego. The map shall be sufficiently detailed to enable a resident to locate his place of residence. Where adequate data are available, the map shall be marked with isograms of Community Noise Equivalent Levels at sixty (60) decibels, and at five (5) decibel intervals above sixty (60) decibels.

B. At least once each year the Administrator shall revise the San Diego City Noise Map, correcting any inadequacies that may have become evident particularly from noise measurements made during the preceding year.

C. Any person may request the Administrator to accept for a location within the City of San Diego, a Community Noise Equivalent Level (CNEL) where none is shown at that location on the San Diego City Noise Map or which differs from one shown there, subject to the following requirements. The request shall be accompanied by an estimate of the annual Community Noise Equivalent Level at the place that is based on (1) a survey of noise there that includes essentially continuous measurement of the sound level over a period of at least two (2) weeks, and (2) appropriate information about the noise-making activity in the area during the test period and during the preceding year. These two items shall be such as to support the stated estimate of annual Community Noise Equivalent Level within an accuracy of two (2) decibels. The survey and estimate of annual Community Noise Equivalent Level for the specific date and place shall be made by a qualified acoustical consultant at the expense of the applicant.

(Old Sec. 59.5.0206 ADMINISTRATOR'S GUIDELINES - Added 9-18-73 by Ord. 11122 N.S.; repealed 9-22-76 by Ord. 11916 N.S.)
(New Sec. 59.5.0206 THE SAN DIEGO CITY NOISE MAP - Added 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0207 BOARD FOR ABATEMENT AND CONTROL OF NOISE

A. Creation of Membership

There is hereby created a Board for Abatement and Control of Noise which shall consist of eleven (11) members: one (1) shall be qualified by training and experience in the field of acoustics; one (1) shall be qualified by training, experience and registration in the field of mechanical engineering; one (1) shall be qualified by training, experience and licensing in the field of architecture; one (1) shall be a qualified physician by training, experience and licensing in the field of physiological effects of noise; one (1) shall be a qualified audiologist by training, experience and licensing; one (1) construction industry contractor; one (1) electronics engineer; one (1) economist; and three (3) general members of the public. The members shall be appointed by the Mayor and confirmed by the Council. Appointments shall be made for two-year terms and each member shall serve until his successor is duly appointed and qualified. The members shall be appointed in such manner that the terms of not more than six (6) members shall expire in any year. The expiration date of all terms shall be January 1. Vacancies shall be filled for the unexpired term of the member whose place becomes vacant. The Mayor shall designate a chairman during January of each year; however, in the absence of such designation, the Board shall, on or after February 15, select from among its members a chairman. Such members shall serve without compensation.

B. Meetings

1. The Board shall meet regularly once a month, or more often if necessary, for the transaction of business. It shall establish its own rules and procedures necessary or convenient for the conduct of business.

2. Six (6) members of the Board shall consitute a quorum. The affirmative vote of not less than five (5) members shall be necessary for any action of the Board.

C. Powers and Duties

1. The Board shall hear and determine appeals from the rulings and determinations of the Noise Abatement and Control Administrator. Such Board may affirm, modify, or overrule the Administrator's rulings and determinations and shall be guided by the same considerations as set forth in Section 59.5.0203 and Division 4 of this article. A decision of the Administrator to refer a matter to the City Attorney for criminal action shall not be appealable to the Board.

2. The Board shall consult with and assist the Administrator in the performance of his duties and responsibilities as set forth herein.

3. The Director of Building Inspection Department shall act as Secretary to the Board. The Secretary shall cause minutes of each meeting of the Board to be kept accurately and distributed promptly. He shall cause appropriate written notice of each forthcoming meeting to be given to all members of the Board and to persons who have business with the Board. He shall procure, prepare, and distribute to members of the Board information which the Board, or any of its members, may require for transaction of business of the Board.

(Old Sec. 59.5.0207 AMENDMENT TO OTHER ORDINANCES - Added 9-18-73 by Ord. 11122 N.S.; repealed 9-22-76 by Ord. 11916 N.S.)
(New Sec. 59.5.0207 BOARD FOR ABATEMENT AND CONTROL OF NOISE - Added 9-22-76 by Ord. 11916 N.S. - formerly Sec. 59.5.0208.)
(Amended 2-2-77 by Ord. 12003 N.S.)

SEC. 59.5.0208 BOARD OF NOISE ABATEMENT AND CONTROL

(Added 9-18-73 by Ord. 11122 N.S.)
(Renumbered to Sec. 59.5.0207 9-22-76 by Ord. 11916 N.S.)

DIVISION 3 – NOISE ABATEMENT CONTRACT COMPLIANCE

(Added 9-18-73 by Ord. 11122 N.S.)

SEC. 59.5.0301 CONTRACT PROVISIONS

A. Contract

As used in this section, the term "contract" shall mean any written agreement or legal instrument whereby The City of San Diego is committed to expend, or does expend, public funds in consideration for work, labor, services, equipment, or any combination of the foregoing, except that the term "contract" shall not include:

1. Contracts for financial or other assistance entered into by The City of San Diego with any federal, state or other local governmental entity or agency.

2. Contracts, resolutions, indentures, declarations of trust, or other legal instruments authorizing or relating to (a) the purchase of insurance, (b) the authorization, issuance, award and sale of bonds, and (c) certificates of indebtedness, notes, or other fiscal obligations of the City.

B. Contract Provisions

No contract shall be awarded or entered into by The City of San Diego unless such contract contains provisions requiring that:

Devices and activities which will be operated, conducted, or constructed pursuant to the contract and which are subject to the provisions of this Code, will be operated, conducted, or constructed without causing a violation of this article.

C. Regulations

The Administrator may, from time to time, recommend to the City's Purchasing Agent and/or other City departments such specifications for the operation or construction of devices and activities pursuant to City contracts. The Administrator shall make the recommendations necessary to achieve compliance with the provisions of this section.

D. No person shall cause or permit the operations of a device or conducting of an activity in such a way as to violate any provisions of a contract required by this section.

E. The provisions of this section shall not apply to those contracts awarded prior to three (3) months from the effective date (October 19, 1973) of this article.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

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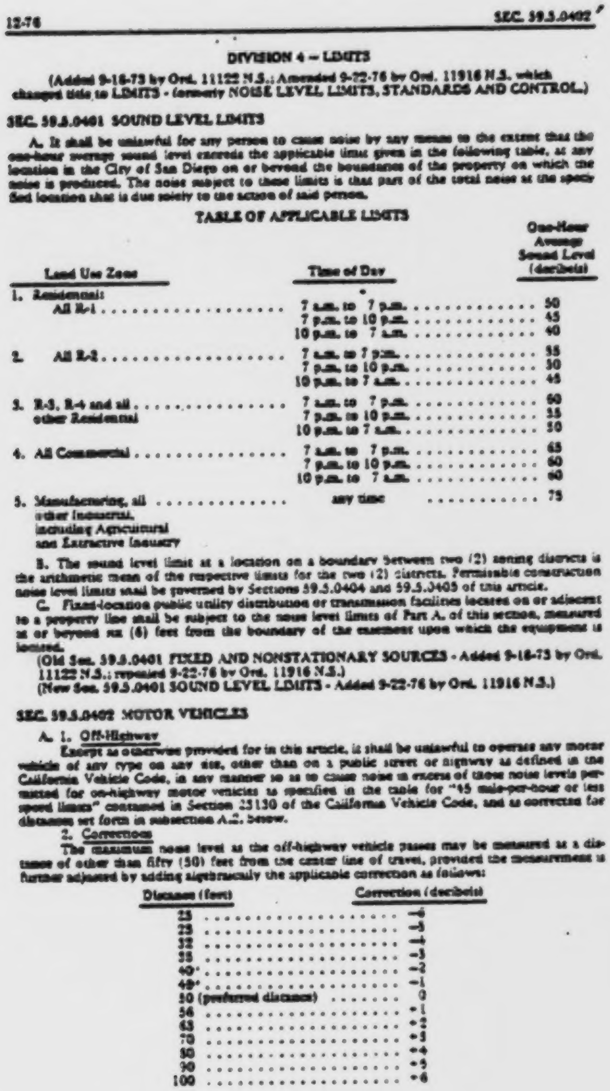

12-76 SEC. 59.5.0402

DIVISION 4 – LIMITS

(Added 9-18-73 by Ord. 11122 N.S.; Amended 9-22-76 by Ord. 11916 N.S. which changed title to LIMITS - formerly NOISE LEVEL LIMITS, STANDARDS AND CONTROL.)

SEC. 59.5.0401 SOUND LEVEL LIMITS

A. It shall be unlawful for any person to cause noise by any means to the extent that the one-hour average sound level exceeds the applicable limit given in the following table, at any location in the City of San Diego on or beyond the boundaries of the property on which the noise is produced. The noise subject to these limits is that part of the total noise at the specified location that is due solely to the action of said person.

TABLE OF APPLICABLE LIMITS

Land Use Zone	Time of Day	One-Hour Average Sound Level (decibels)
1. Residential: All R-1	7 a.m. to 7 p.m.	50
	7 p.m. to 10 p.m.	45
	10 p.m. to 7 a.m.	40
2. All R-2	7 a.m. to 7 p.m.	55
	7 p.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
3. R-3, R-4 and all other Residential	7 a.m. to 7 p.m.	60
	7 p.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
4. All Commercial	7 a.m. to 7 p.m.	65
	7 p.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	60
5. Manufacturing, all other Industrial, including Agricultural and Extractive Industry	any time	75

B. The sound level limit at a location on a boundary between two (2) zoning districts is the arithmetic mean of the respective limits for the two (2) districts. Permissible construction noise level limits shall be governed by Sections 59.5.0404 and 59.5.0405 of this article.

C. *Fixed-location* public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise level limits of Part A. of this section, measured at or beyond six (6) feet from the boundary of the easement upon which the equipment is located.

(Old Sec. 59.5.0401 FIXED AND NONSTATIONARY SOURCES - Added 9-18-73 by Ord. 11122 N.S.; repealed 9-22-76 by Ord. 11916 N.S.)
(New Sec. 59.5.0401 SOUND LEVEL LIMITS - Added 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0402 MOTOR VEHICLES

A. 1. Off-Highway

Except as otherwise provided for in this article, it shall be unlawful to operate any motor vehicle of any type on any site, other than on a public street or highway as defined in the California Vehicle Code, in any manner so as to cause noise in excess of those noise levels permitted for on-highway motor vehicles as specified in the table for "45 mile-per-hour or less speed limits" contained in Section 23130 of the California Vehicle Code, and as corrected for distances set forth in subsection A.2. below.

2. Corrections

The maximum noise level as the off-highway vehicle passes may be measured at a distance of other than fifty (50) feet from the center line of travel, provided the measurement is further adjusted by adding algebraically the applicable correction as follows:

Distance (feet)	Correction (decibels)
25	−6
28	−5
32	−4
35	−3
40	−2
45	−1
50 (preferred distance)	0
56	+1
63	+2
70	+3
80	+4
90	+5
100	+6

179-5

3. A measured noise level thus corrected shall be deemed in violation of this section if it exceeds the applicable noise-level limit as specified above.

B. Nothing in this section shall apply to authorized emergency vehicles when being used in emergency situations, including the blowing of sirens and/or horns.

(Old Sec. 59.5.0402 VEHICLE AND NONSTATIONARY SOURCE REPAIRS - Added 9-18-73 by Ord. 11122 N.S.; repealed 9-22-76 by Ord. 11916 N.S.)

(New Sec. 59.5.0402 MOTOR VEHICLES - Added 9-22-76 by Ord. 11916 N.S. - formerly Sec. 59.5.0403.)

SEC. 59.5.0403 WATERCRAFT

Violations for excessive noise of watercraft operating in waters under the jurisdiction of The City of San Diego shall be prosecuted under applicable provisions of the California Harbors and Navigation Code. Permits issued by The City of San Diego for the operation of watercraft not in compliance with noise criteria of the Harbors and Navigation Code shall be reviewed and approved by the Administrator prior to issuance.

(Old Sec. 59.5.0403 MOTOR VEHICLES - added 9-18-73 by Ord. 11122 N.S.; renumbered 9-22-76 by Ord. 11916 N.S. - now Sec. 59.5.0402.)

(New Section 59.5.0403 WATERCRAFT - added and amended 9-22-76 by Ord. 11916 N.S. formerly Sec. 59.5.0407.)

SEC. 59.5.0404 CONSTRUCTION NOISE

A. It shall be unlawful for any person, between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays, to erect, construct, demolish, excavate for, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator. In granting such permit, the Administrator shall consider whether the construction noise in the vicinity of the proposed work site would be less objectionable at night than during the daytime because of different population densities or different neighboring activities; whether obstruction and interference with traffic particularly on streets of major importance, would be less objectionable at night than during the daytime; whether the type of work to be performed emits noises at such a low level as to not cause significant disturbances in the vicinity of the work site; the character and nature of the neighborhood of the proposed work site; whether great economic hardship would occur if the work were spread over a longer time; whether proposed night work is in the general public interest; and he shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise levels as he deems to be required in the public interest.

B. The provisions of this section shall not apply to emergency work as defined herein, provided that the Administrator shall be notified of such emergency work forthwith.

(Old Sec. 59.5.0404 URBAN TRANSIT BUSES - Added 9-18-73 by Ord. 11122 N.S.; repealed 9-22-76 by Ord. 11916 N.S.)

(New Sec. 59.5.0404 CONSTRUCTION NOISE - Added and amended 9-22-76 by Ord. 11916 N.S. formerly Sec. 59.5.0408.)

SEC. 59.5.0405 CONSTRUCTION ACTIVITIES

A. Except as provided in subsection B. hereof, it shall be unlawful for any person, including The City of San Diego, to conduct any construction activity so as to cause, at or within the property lines of any property zoned residential, an average sound level greater than seventy-five (75) decibels during the twelve (12) hour period from 7:00 a.m. to 7:00 p.m.

B. The provisions of subsection A. of this section shall not apply to construction equipment used in connection with emergency work, provided the Administrator is notified within forty-eight (48) hours after commencement of work.

(Old Sec. 59.5.0405 POWERED MODEL VEHICLES - Added 9-18-73 by Ord. 11122 N.S.; repealed 9-22-76 by Ord. 11916 N.S.)

(New Sec. 59.5.0405 CONSTRUCTION ACTIVITIES - Added and amended 9-22-76 by Ord. 11916 N.S. formerly Sec. 59.5.0409.)

SEC. 59.5.0406 REFUSE VEHICLES AND PARKING LOT SWEEPERS

No person shall operate or permit to be operated a refuse compacting, processing or collection vehicle or parking lot sweeper between the hours of 7:00 p.m. to 7:00 a.m. in any residential area unless a permit has been applied for and granted by the Administrator.

(Sec. 59.5.0406 REFUSE VEHICLES - Added 9-18-73 by Ord. 11122 N.S.; amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0407 WATERCRAFT

(Added 9-18-73 by Ord. 11122 N.S.)
(Renumbered 9-22-76 by Ord. 11916 N.S., now Sec. 59.5.0403.)

SEC. 59.5.0408 CONSTRUCTION NOISE

(Added 9-18-83 by Ord. 11122 N.S.)
(Renumbered 9-22-76 by Ord. 11916 N.S., now Sec. 59.5.0404.)

SEC. 59.5.0409 CONSTRUCTION EQUIPMENT

(Added 9-18-73 by Ord. 11122 N.S.)
(Renumbered 9-22-76 by Ord. 11916 N.S., new Sec. 59.5.0406.)

SEC. 59.5.0410 CONTAINERS AND CONSTRUCTION MATERIAL

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0411 EXTERIOR NOISE ISOLATION STANDARDS

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0412 TRAIN HORNS AND WHISTLES – EXCESSIVE SOUND PROHIBITED

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0415 SIGNAL DEVICE FOR FOOD TRUCKS

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

DIVISION 5 – PUBLIC NUISANCE NOISE

(Added 9-18-73 by Ord. 11122 N.S., Amended 9-22-76 by Ord. 11916 N.S. which changed title to PUBLIC NUISANCE NOISE - *formerly* GENERAL NOISE REGULATIONS.)

SEC. 59.5.0501 GENERAL PROHIBITIONS

A. It shall be unlawful for any person to make, continue, or cause to be made or continued, within the limits of said City, any disturbing, excessive, or offensive noise which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

B. The characteristics and conditions which should be considered in determining whether a violation of the provisions of this section exists should include, but not be limited to the following:

1. The level of the noise;
2. Whether the nature of the noise is usual or unusual;
3. Whether the origin of the noise is natural or unnatural;
4. The level of the background noise;
5. The proximity of the noise to sleeping facilities;
6. The nature and zoning of the area from which the noise emanates;
7. The time of day or night the noise occurs;
8. The duration of the noise; and
9. Whether the noise is recurrent, intermittent, or constant.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0502 DISTURBING, EXCESSIVE, OFFENSIVE NOISES – DECLARATION OF CERTAIN ACTS CONSTITUTING

The following activities, among others, are declared to cause disturbing, excessive or offensive noises in violation of this section but said enumeration shall not be deemed to be exclusive, namely:

A. Horns, Signaling Devices, etc.

Unnecessary use or operation of horns, signaling devices, etc., on automobiles, motorcycles, or any other vehicle.

B. Radios, Television Sets, Phonographs, Loud Speaking Amplifiers and Similar Devices

1. Uses Restricted

The use, operation, or permitting to be played, used, or operated, any sound production or reproduction device, radio receiving set, musical instrument, drums, phonograph, television set, loud speakers and sound amplifiers or other machine or device for the producing or reproducing of sound in such a manner as to disturb the peace, quiet, and comfort of any reasonable person of normal sensitiveness. This provision shall not apply to any participant in a duly-licensed parade, or to any person who has been otherwise duly authorized by The City of San Diego to engage in such conduct.

2. Prima Facie Violations

The operation of any such set, instrument, phonograph, television set, machine, loud speakers or similar device between the hours of 10:00 p.m. and 8:00 a.m. in such a manner as to be plainly audible at a distance of fifty (50) feet from the building, structure, or vehicle in which it is located, shall be prima facie evidence of a violation of this section.

C. Yelling, Shouting, etc.

Loud or raucous yelling, shouting, hooting, whistling or singing on the public streets between the hours of 10:00 p.m. and 8:00 a.m., or at any time or place, is hereby prohibited.

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D. Animals

1. The keeping or maintenance, or the permitting to be kept or maintained upon any premises owned, occupied, or controlled by any person of any animal or animals which by any frequent or long-continued noise, shall cause annoyance or discomfort to a reasonable person of normal sensitiveness in the vicinity.

2. Prima Facie Violations

The noise of any such animal or animals that disturbs two (2) or more residents who are in general agreement as to the times and durations of the noise, and who reside in separate residences (including apartments and condominiums) located on property adjacent at any point to the property on which the subject animal or animals are kept or maintained shall be prima facie evidence of a violation of this section.

E. Schools, Courts, Churches, Hospitals

The creation of any noise in or adjacent to any school, institution of learning (except recreational areas of schools), church, court, or library without permission of the person in charge while the same are in use; or adjacent to a hospital, rest home, or long-term medical or mental care facility which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital, rest home, or long-term medical or mental care facility, provided conspicuous signs are displayed in such streets, sidewalks, or public places indicating the presence of a school, institution of learning, church, court, library, rest home, or long-term medical or mental care facility.

F. Engines and Motor Vehicles

Any unnecessary noises caused by screeching tires, racing, or accelerating the engine of any motor vehicle while moving or not moving, or the wilfull backfiring of any engine and exhaust from the engine, tailpipe, or muffler.

G. Playing of Radios on Buses

The operation of any radio, phonograph, or tape player on an urban transit bus that is audible to any other person in the bus is prohibited.

(Sec. 59.5.0502 LOUD, UNUSUAL NOISES – DECLARATION OF CERTAIN ACTS CONSTITUTING - Added 9-18-73 by Ord. 11122 N.S.; Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0503 BURGLAR ALARMS

A. On or after one (1) year from the effective date of this article, no owner of a commercial property, dwelling, or motor vehicle shall have in operation an audible burglar alarm therein unless such burglar alarm shall be capable of terminating its operation within twenty (20) minutes of its being activated.

B. Notwithstanding the requirements of this provision, any member of the Police Department of The City of San Diego shall have the right to take such steps as may be reasonable and necessary to disconnect any such alarm installed in any building, dwelling, or motor vehicle at any time during the period of its activation. On or after thirty (30) days from the effective date of this article, any building, dwelling or motor vehicle upon which a burglar alarm has been installed shall prominently display the telephone number at which communication may be made with the owner of such building, dwelling, or motor vehicle.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

DIVISION 6 – VIOLATIONS AND ENFORCEMENT

(Added 9-18-73 by Ord. 11122 N.S.)

SEC. 59.5.0601 VIOLATIONS: MISDEMEANORS

Any person violating any of the provisions of this article shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined in an amount not exceeding five hundred dollars ($500) or be imprisoned in the City or County jail for a period not exceeding six (6) months, or by both such fine and imprisonment. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such.

(Added 9-18-73 by Ord. 11122 N.S.)

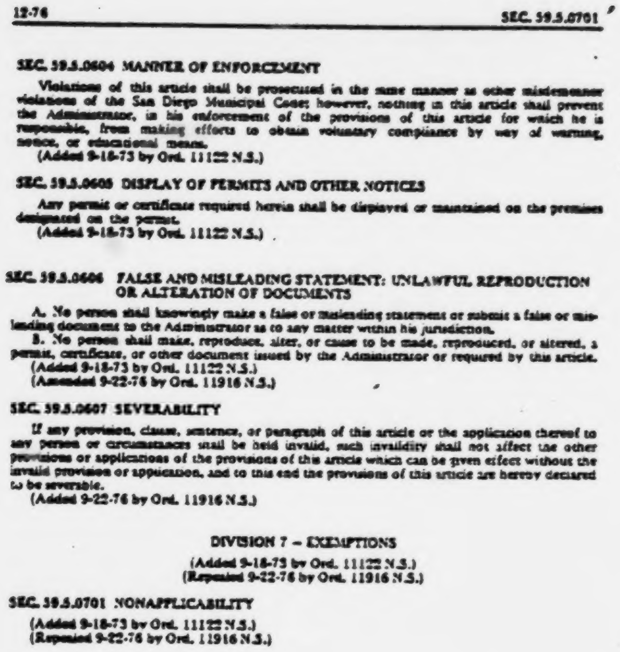
SEC. 59.5.0602 VIOLATIONS: ADDITIONAL REMEDIES: INJUNCTIONS

As an additional remedy, the operation or maintenance of any activity, device, instrument, vehicle or machinery in violation of any provision of this article, which operation or maintenance causes discomfort or annoyance to reasonable persons of normal sensitiveness or which endangers the comfort, repose, health, or peace of residents in the area, shall be deemed, and is declared to be, a public nuisance, and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0603 ENFORCEMENT

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)



12-76 SEC. 59.5.0701

SEC. 59.5.0604 MANNER OF ENFORCEMENT

Violations of this article shall be prosecuted in the same manner as other misdemeanor violations of the San Diego Municipal Code; however, nothing in this article shall prevent the Administrator, in his enforcement of the provisions of this article for which he is responsible, from making efforts to obtain voluntary compliance by way of warning, notice, or educational means.

(Added 9-18-73 by Ord. 11122 N.S.)

SEC. 59.5.0605 DISPLAY OF PERMITS AND OTHER NOTICES

Any permit or certificate required herein shall be displayed or maintained on the premises designated on the permit.

(Added 9-18-73 by Ord. 11122 N.S.)

SEC. 59.5.0606 FALSE AND MISLEADING STATEMENT: UNLAWFUL REPRODUCTION OR ALTERATION OF DOCUMENTS

A. No person shall knowingly make a false or misleading statement or submit a false or misleading document to the Administrator as to any matter within his jurisdiction.

B. No person shall make, reproduce, alter, or cause to be made, reproduced, or altered, a permit, certificate, or other document issued by the Administrator or required by this article.

(Added 9-18-73 by Ord. 11122 N.S.)
(Amended 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0607 SEVERABILITY

If any provision, clause, sentence, or paragraph of this article or the application thereof to any person or circumstances shall be held invalid, such invalidity shall not affect the other provisions or applications of the provisions of this article which can be given effect without the invalid provision or application, and to this end the provisions of this article are hereby declared to be severable.

(Added 9-22-76 by Ord. 11916 N.S.)

DIVISION 7 – EXEMPTIONS

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

SEC. 59.5.0701 NONAPPLICABILITY

(Added 9-18-73 by Ord. 11122 N.S.)
(Repealed 9-22-76 by Ord. 11916 N.S.)

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B.4.3 Complaint response procedure

Four administrative stages are used for processing noise complaints:

a. The first administrative response includes answering telephone requests for assistance and mailing a blank Complaint Registration Form; when the completed form is returned, a standardized warning, modified to reflect the details of the complaint, is mailed to the offender within 24 hr.

b. A field investigation of the problem is scheduled automatically upon receipt of a second complaint about that problem. A final notice is mailed to the alleged offender notifying him that an investigator is now assigned and that further action will be taken. The investigator is authorized to offer suggestions in an attempt to mediate a solution.

c. A hearing is conducted if the investigator fails to mediate successfully. The administrator conducts the hearing in the presence of the investigator, the complaining witness, and the alleged offender. The administrator arbitrates, making a preliminary decision as to whether or not the code has been violated. The administrator will usually suggest specific actions to the alleged offender in order to achieve compliance and avoid prosecution. If insufficient data are available to show a violation of the code, the administrator would so inform the complaining witness.

d. Prosecution is initiated as a final stage when the actions proposed during arbitration are not followed, resulting in failure to comply. Approximately 30 cases were prosecuted during 4 years of administration. In each of these cases, a conviction was handed down. Fines ranged from suspended sentence to $500.

e. The procedure for prosecution is as follows:

   1. If compliance is not achieved by arbitration, the administrator forwards a request for prosecution, with all case files, to the City Attorney's office.

   2. The City Attorney's office issues a notify warrant that requests the attendance of the alleged offender at arraignment court to enter a plea.

   3. The administrator attends arraignment court to answer specific questions that may require his experience. In most cases, a guilty plea is entered, and the judge will request information concerning appropriate sentencing.

      It has been the policy of the administrator to point out to the judge that the case would not have been brought to trial had it not been for the willful noncompliance of the defendant and that this willful noncompliance has caused great expense to the taxpayers of San Diego.

      In the event that a not-guilty plea is entered, the administrator prepares case information, testimony, and witnesses for trial. The adminstrator's investigators, witnesses, and occasionally the administrator will testify during the trial. Trials have generally lasted from 4 to 8 hr. All trial proceedings have resulted in convictions.

B.4.4 Previous noise laws and events responsible for the present law

a. Between 1973 and 1976, San Diego enforced a law that contained objective sound level limits and that differed considerably from current sound level limits. These previous limits were expressed as permitted increases in sound level above the higher of the "measured ambient noise level" or above specified "noise level limits." Applicable "noise level limits" depended upon land use zone and time of day. The permitted increase in sound level depended upon the duration of the increase.

b. Enforcement of these pre-1976 sound level limits entailed:

- Measurement of the "ambient noise level," which was defined as "the sound level mean square averaged over a period of fifteen (15) minutes without inclusion of the sounds from the identifiable source and randomly occurring intermittent noises from any other isolated identifiable source."
- Selection of the higher of the "ambient noise level" and the applicable "noise level limit."

- Measurement of the sound level/duration characteristics of the noise source in question.
- Determination of whether the sound levels of the noise source exceeded the applicable limits for more than the permitted duration.

c. Numerous measurement problems were encountered:

- It was difficult to measure sound levels that fluctuated more than 10 dB because of the necessity of switching scales on the sound level meter equipment available at the time.
- Fluctuating sound levels were difficult to time-average using the duration correction table. As a compromise, the investigator would often measure the vacillating level for a briefer period or would spend inordinate time attempting to interpolate between the highs and lows of the bouncing needle. Such techniques, of course, presented a very unconvincing image to the noise maker.
- It was impractical for minimally experienced field personnel to interpolate the permissible level for each duration even when the sound level measured was relatively constant. The 15-min increments referenced in the code are easy to use only with a working understanding of the semilogarithmic function. Eventually, a graph was constructed of the sound level vs duration curve. Even with the use of this graph, the other problems precluded satisfactory enforcement.

- The maximum level/duration correction table criteria were repealed, and the A-weighted average sound level criteria were adopted. This was not so much a change in the standards as it was a change in application of a more sophisticated measurement criteria. This revision in part was prompted by the appearance of affordable instrumentation capable of measuring and printing out the average sound level. This first time-averaging sound level meter was a Deltec 8000. Almost immediately, a marked improvement in the enforcement image occurred. The easy-to-read digital display and hard copy printout added confidence to the investigator's effort. It quickly became apparent that voluntary compliance was forthcoming only when the noise maker could be shown plainly that the noise in question was easily quantifiable. As in any law enforcement procedure, uncertainty surrounding the observation of any crime becomes a defense.

B.4.5 Permits and variances

Absolutely key to the administrator's authority to "demand" compliance is the counterbalancing authority to grant permits and variances when circumstances warrant. The permit and variance procedure in San Diego was tailored after the zoning variance and permit procedure. The basic idea was that when compliance could not be readily achieved, and when it was impractical or uneconomical especially for a business concern to stop the noise by turning off the source, a variance (conditioned appropriately) could be obtained (1) to allow continued operation for a minimal period to correct the problem, and (2) to ensure absolute compliance with the code.

During early development of the noise regulations by the City staff/industry/citizen task force, arguments continually arose for restricting specific sources. One of the members recalled, for example, that he had been kept awake the night before by a particular source. It would, of course, be discriminatory to single out a particular company in a general code. The task force discovered, however, that by including a variance procedure, they could avoid specious discussion belaboring isolated noise problems, and personal crusades were avoided during the often exhausting task force meetings. The variance procedure allows the community to enjoy the benefits of highly specific examination of controversial noise problems, while the noise source operator or owner receives special consideration and qualified exemptions from inappropriate requirements of the general code.

The variance and permit procedure includes the following steps:

1. Discovery of the violation.
2. Notification to the owner or operator of the equipment.
3. Compliance achieved and measured, or a variance request submitted.
4. Acoustical analysis report prepared by an acoustician.
5. Variance hearing scheduled.

6. The details of the acoustical analysis, compliance schedule, and performance of modifications for compliance are discussed at the hearing.
7. A decision is made by the administrator.
8. The findings and disposition of the hearing are published.

The salient features of variance are:

- Description of specific noise problem
- Findings of fact (synopsis of the problem and conditions setting it apart from normal consideration)
- Conditions (i.e., essentially tailored law) under which the variance is granted.

B.4.6 Instrumentation

San Diego now has in its inventory a Computer Engineering Limited 162 ex time-averaging sound level meter, with L_n, SEL, and octave-band filtering capacity. This unit weighs approximately 26 lb and has the capability of integrating sound level durations as short as 1/200 sec. The unit was purchased because of its integration capability, its light weight, and for certain convenience features felt by the staff to enhance use in the field. The Deltec 8000 is also a time-averaging sound level meter with hard copy printer, but weighs approximately 45 lb. This unit was purchased in 1974 on an experimental basis to determine if average sound level would be a practical enforcement tool.

Two GenRad sound level meters are used: 1563 traffic meter, and 1565 hand-held meter. A dB-306 Metrologger is used for most noise enforcement activity because of its small size and ease of operation.

The CEL 162 ex and Deltec 8000 are used primarily for ground transportation noise source measurements and aircraft overflight measurement. When used for ground transportation monitoring, the units are typically stored in a residence near the subject corridor and near an automated traffic counter. A linear regression of the Hourly Noise Level (HNL) vs 10 log 10 Hourly Vehicle Trips (HVT) is computed to determine the average HNL for each vehicle on the subject corridor. The value is used as a basic multiplier for determining Community Noise Equivalent Levels and to predict future noise impacts resulting from increased traffic volumes.

The GenRad meters are now used exclusively for the enforcement of vehicle noise limits. When a police officer suspects that a vehicle is too loud, he issues a warning citation. The driver of the automobile is instructed to clear the violation through the Noise Abatement and Control Office by submitting to a California Highway Patrol-designed acceleration/deceleration drive-by test. If the driver fails to pass the test, repeated opportunities are offered until compliance is met. Compliance has thus been gained without the necessity of court procedures in each of these cases. The dB-306 Metrologger is used frequently in the measurement of discotheque noise. Widely fluctuating noise levels measured in dim light are easily read on the light-emitting-diode display of the average sound level. A measurement period of 2 or 3 min indicates what reduction in level is necessary in order to comply with the code.

B.4.7 Some problems with the current program

The use of average sound level (HNL or L_{eq}) is by no means perfect. When an unusually high level, but short-duration, noise (such as dog barking) occurs within the period of 1 hr, the averaging method simply does not fully describe the annoyance. This is especially true during the evenings when residents are returning home away from the workday din and stress, and during the nighttime hours when masking ambient sound levels frequently drop 8 to 12 dB from daytime levels. A Single Event Level (SEL) criterion, however, was considered for control of such events. To schedule large numbers of long-term field measurements to catch these transitory events (e.g., dog barking and loud music) was impractical.

B.4.8 Approximate annual program costs

a.	Salaries and benefits (five people, full time on noise program, see B.4.9)	$ 85,000
b.	Other	19,000
		$104,000

B.4.9 Other noise-related services

San Diego's Office of Noise Abatement and Control, in addition to enforcing the San Diego Municipal Noise Control Ordinance (B.4.1), enforces many state-level noise control laws including the motor vehicle sound level limits, the motorboat noise regulation, and the noise insulation standards.

B.4.10 Other statistics

a. Population — 800,000.

b. Complaints received (1977) — 2,320.

c. Percent of complaints received that were about barking dogs — 85%.

d. Percent of complaints (excluding barking dogs) for which noise measurements were made — 40%.

APPENDIX C

DEVELOPMENT OF BENEFIT ASSESSMENT PROCEDURE

Report No. 3788

DEVELOPMENT OF BENEFIT ASSESSMENT PROCEDURE: TASK 1 OF ENVIRONMENTAL ASSESSMENT OF COMMUNITY NOISE CONTROL STRATEGIES

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March 1978

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Washington, D.C. 20460
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C-1-

TABLE OF CONTENTS

PAGE

1. INTRODUCTION.... -1-

2. ASSESSMENT OF BENEFITS.... -4-

    2.1 Definitions.... -4-
    2.2 Noise Impact Assessments.... -5-

        2.2.1 Impact from complaints.... -6-
        2.2.2 Impact by calculation from physical noise surveys.... -10-
        2.2.3 Impact from social survey.... -21-

3. SELECTING A BENEFIT ASSESSMENT PROCEDURE.... -31-

    3.1 Noise-Stratified Attitude Surveys.... -35-
    3.2 Assessing Benefits with a "Specific" Response Curve.... -42-

4. ALTERNATIVES TO BENEFIT ASSESSMENTS.... -46-

REFERENCES.... -51-

1. INTRODUCTION

TASK: Design and develop a uniform benefit assessment procedure to quantify the benefits in differing noise impact environments before and after community noise programs are enacted.

Before getting into the task, it is useful to ask: "Why?" The answer is simple; there is an urgent need to assess the environmental benefits of both potential and present State and local (S/L) noise control enforcement,since (1) effective S/L noise control programs are an essential part of a national strategy for noise abatement and control,and (2) the benefits are often unknown and even when known are almost always unquantified.

Various regulatory forms and enforcement techniques have been available to, and have been used by, S/L governments in varying degrees. Few of these governments have sought to quantify the environmental benefits of their programs, a state of affairs partly due, no doubt, to the lack of any generally-agreed-on method of quantifying the benefits of such programs.

The S/L regulatory programs and the Federal regulatory programs need to be coordinated by EPA through the development of a unified program which will maximize the benefits. If EPA-ONAC is to develop such a program, it is essential that a uniform benefit assessment procedure be available for application in the EPA-sponsored study of old and new S/L noise control enforcement efforts. The uniform procedure will have obvious uses to S/L governments themselves now and in the future.

Knowing quantitatively what benefits are actually achieved by a particular noise control program is essential to a S/L government (1) in verifying the expectations for the program, (2) in diagnosing program failures, and (3) in evaluating pilot tests of new program features. How should a state or local government determine the benefits so that these important uses are served? We believe that the answer to this question will be the most useful benefit assessment procedure for EPA-ONAC. It is necessary but not sufficient (for example) that the method be quantitative to serve the purpose of EPA in comparing enforcement strategies. However, unless, in addition, the method serves the needs of S/L governments now and in the future, it may become only another theoretical tool of temporary use in the present study.

What are the fundamental problems encountered in designing a benefit assessment procedure? Let us divide these problems into three categories:

- how benefits should be identified
- how benefits should be quantified
- how benefits should be measured.

This report on Task I will address these three questions, and in doing so, will address first the theoretical aspects, and then the practical ones. It will discuss several hypothetical approaches to assessing benefits, some that have been used in state and local governments, some that have been described before in the literature, and some that have not.

2.0 ASSESSMENT OF BENEFITS

2.1 Definitions

To start, we shall define the necessary concepts carefully. The "quantitative assessment of benefits from noise reduction" can only be the process of getting the numerical change in some measure(s) of the noise impact; in other words, getting the numerical difference between two values of some well-defined measure of noise impact, one taken before and one taken after a period in which a known noise reduction program was operating.

What is to be the measure? It has to be a measure of the impact of the noise. It could be some measure correlated with the noise impact if the noise impact can be estimated with adequate reliability and precision by calculations based on the selected measure. Before we can discuss what measures might correlate with impact, we must define "noise impact." It must be an impact, the effect, and not the noise that causes the effect. Thus, the inherent measure of impact cannot be one of physical sound. The impact is the effect of the sound on people, and people are not sound level meters that show the effect of sound by the position of a needle on a meter scale.

The effects of sound on people are physiological and behavioral. While some of these effects on individual and small groups can be observed in a laboratory by measuring certain kinds of performance, the effects of environmental sound on a community cannot. These effects, by which community benefits must be measured, can only be measured directly in the community, where all the social forces that affect the outcome are present and free to work. As we will see, the only practical way to learn about the effects on enough people to characterize the community sufficiently is to use an attitudinal survey, and a rather special one.

2.2 Noise Impact Assessments

At this point it will be helpful to review how communities have done noise impact assessments. The literature (Schultz, 1972; Pearsons and Bennett, 1974; Bugliarello _et al_, 1976; National Research Council, 1977; Chaba, 1977) suggests that this can be done in several ways, although not all of these ways are consistent with the definition of noise impact as developed here thus far.

2.2.1 Impact from complaints

One traditional method is to base the assessment solely on the number of complaints. This method has severe limitations, including those due to the biases by nonpublic health and welfare factors such as socio-economic status (which includes income, education, and occupation), the interactions of individuals within the community social organization, the accessibility of government, the likelihood of response (including media feedback), and the utility of the noise source to the individual.

Since complaints are readily quantifiable, and since S/L governments with noise control staff do keep records of complaints, the evaluation of noise impact by a count of complaints is intrinsically attractive. So, let us examine what these biases do, and see if these limitations can be avoided by any manipulation of the data. Within a given community, biases due to socio-economic factors will be relatively stable in the short term in individual neighborhoods, barring major forces such as urban renewal, severe disruption of the housing market (e.g., the collapse of the home mortgage system in the panic of the 1870's), or rapid change in racial character (e.g., "white flight"). Thus, complaint data could be used to assess impact in a neighborhood of uniform socio-economic status, but not to compare impact in neighborhoods of different status.

The next factor, social interaction, results in fewer complaints from individuals who are strangers to the informal social organizations within the neighborhood and the community. Transients (e.g., inhabitants of transient rooming houses, of young singles apartments) who have little time to develop social interactions, and those whose focus for social interactions are centered outside their community (co-workers at an out-of-town employer, out-of-town clubs and activity groups) will produce fewer complaints than those residents who are well-established in the community's formal and informal social organization (e.g., church, school, neighborhood, fraternal, sports). The social interaction with others who are exposed to the same noise and who share some values with the individual provides reinforcement for complaints not yet made to public authorities. Thus, complaint data from a community that has both kinds of residents cannot be interpreted uniformly to assess impact nor to relate impact to environmental noise exposure.

The accessibility of government or public authority to those who have a complaint has a very strong effect on the number of complaints recorded. Communities we have studied have experienced the initially-dismaying rise in complaints after their first noise control program had begun. What noise control was being accomplished yielded no measurable benefits as seen through complaint data, because the process of setting up the noise control program had increased complaints by providing a public focus and forum for complaints about noise. Environmental noise exposures that result in high annoyance produce few complaints to public authorities when there is no individual or agency that invites such complaints ("you can call City Hall, but you get the impression that no one is really listening or taking it down") and produce many more complaints and better complaint documentation and accounting when there is a noise control office listed in the telephone book, and especially when there is a well-publicized "noise hot line" telephone. Thus, complaint data is especially difficult to use to assess noise impact before and after a noise control program.

In much the same way, the likelihood of response from public authority or from the media strongly influences the probability of complaint. Thus, the very act of establishing and publicizing a noise control program that will provide a response to complaints will increase the number of complaints. The form of the bias is a severe problem; the greater the public perception of the benefits of the new noise control program, the greater the number of complaints about environmental noise exposures that result in high annoyance.

Finally, the literature makes it clear that the utility of the noise source to the potential complainant is a strong influence on the probability that the complaint will be made. This effect has been documented since the 1950's, when it was observed that public explanations of the national defense role of military jet aircraft ground runups (a noise widely heard in communities near military airbases) reduced complaints although no reduction of noise took place. More recent examples include the practice of some individual industrial noise- makers to buy the homes of complaining neighbors, and resell them to the industry's own employees. This effect need not always be the result of such deliberate intervention. The individual who draws his pay from the source of the noise is more likely to be concerned about the loss of jobs in that industry than others in the community, and may view complaints as counter-productive to his individual good. When neighborhoods near certain noisy industries derive their income and perhaps their existence from those industries, complaint data will seriously understate the noise impact.

Although the discussion above has treated the complaint biases due to five important factors, there is a more fundamental problem with complaint data -- it is the process itself by which noise generates complaints. This will be discussed more fully in a later section; here we will note only that people exhibit a threshold effect below which no complaint is made. Worse yet, this is a variable threshold, and one whose variation can be strongly dependent on the very variables that we want to study through the medium of complaint data.

2.2.2 Impact by calculation from physical noise surveys

A second method, one that has become increasingly popular for government agencies that try quantitative analysis, is to conduct a base-line survey to determine the noise climate in the community, and from this physical survey data and prior knowledge of the relationship between noise exposure and impact derived from social surveys, deduce the public health and welfare impact. Several noise characterization methods have been used to express this "impact" in terms of the number of people exposed to various noise doses. It is, of course, not an "impact," but rather an exposure. The EPA-ONAC has used, since 1974, an impact weighting function to reduce the population exposure to a single number called "Equivalent Noise Impact." Recently, a working group of the National Academy of Sciences -- National Research Council proposed a revision to that method (CHABA, 1977). In either case, the "Equivalent Noise Impact" is the sum of "fractional impacts", each the product of a weighting value for the sound exposure and the number of people exposed to that sound, In the method used to date by EPA, the baseline zero-impact level is 55 dB YDNL (the yearly day-night average level) and the weighting function is: W(Ldn) = 0.05 (Ldn - 55). In the proposed revision, the baseline YDNL is never higher than 55 nor lower than 35, and values less than 55 are used when necessary to ensure that the range between the highest and lowest residential YDNL being studied is at least 20 dB. Thus, if the highest YDNL is 65, a baseline of 45 rather than 55 would be used. The weighting function is: W(Ldn) = 1.68 [10 exp (0.103 Ldn-5)]/[10 exp (0.03 Ldn) + 7.15 10 exp (0.08 Ldn-4)].

Both weighting functions have been normalized to 1.00 at Ldn = 75 dB.

The "Equivalent Noise Impact" (ENI) is termed "Sound Level Weighted Population" (LWP) in the CHABA proposal. The latter name is technically more appropriate since the unit of ENI (or of LWP) is people. Despite the popularity of the concept of "Equivalent Noise Impact," neither ENI nor LWP is an impact; LWP is described by its creators as "a single number representation of the significance of the noise environment to the exposed population." The point here is that the mathematical manipulations with population, noise dose and a weighting function do not make these quantities into impact, which was defined earlier as the effect of noise on the community. This statement should not be viewed as criticism of these concepts; rather these calculation procedures yield important measures of community (not individual) exposure. These measures are important, not in themselves, but because they have been designed to correlate well with the impact of the environmental noise on the community. It is precisely through this correlation that the useful end result, an estimate of the impact, may be sought.

This observation leads directly to the short discussion, promised earlier, of the process by which noise produces observable effects, including complaints. While we do not know every detail of the physiological and mental effects in an individual as a result of the presence of a known environmental noise, a useful model can be constructed from certain observations. It is a simple model; a chain relationship. This chain, with examples for each element, is shown below.

SOUND--->	DIRECT EFFECT--->	REACTION--->	ACTION
• Noise	• Sensation	• Annoyance	• Complaint
	• Functional Effects		• Physical or Legal Acts
	• Health Effects		

A discussion of the possible or probable direct and feedback mechanisms linking each of these elements with its neighbors will not be attempted here, nor is it called for. We need only observe that the time phases are logical, and that:

- without sound, audible above the background, there is no true detection and sensation of sound,
- without at least these minimal direct effects, there is no annoyance truly due to sound,
- without this simple adverse reaction, there would be no overt actions to reduce the noise.

The importance of this model is that it helps us recognize that when we want to use any element toward the left to predict any element to its right, we can do so at our present state of knowledge only by referring to documented evidence of correlation between these elements. There are no widely-accepted scientific laws, deduced from an examination of the linking mechanisms, that tell us precisely how much of one element produces how much of another. Moreover, it is not the elements themselves that are being linked, but selected definitions and measures of the elements, and these have changed from one correlation study to the next. Indeed, the best definitions and measures have not been obvious. The history of modern acoustics, including psychoacoustics and socio-acoustics is a recurring search for better identification, quantification and measurement methods for sound, for the direct effects, and for the behavioral reactions, in order to achieve higher correlation between a pair of these elements and thus correspondingly more accurate predictive methods.

For example, a satisfactory quantification of sound has proved to be difficult. The simplest measures, such as instantaneous readings of overall sound pressure level produce very low correlations with annoyance or even the direct effects such as the sensation of loudness or speech interference. As more attributes or "dimensions" of sound (e.g., spectrum, time pattern) were included, the quantification became more complex: time averages of octave band levels, frequency-weighted sound levels, statistical descriptions of histories of sound levels, energy-equivalent sound level for time periods of interest, and now the yearly average day-night sound level which is the underlying measure of sound used with both ENI and with LWP. These, and many others are discussed in a recent British report (Robinson, 1977). A corresponding search for useful behavioral measures (that we need in order to quantify benefits) has also taken place, and is outlined in a recent review of social surveys on noise (Bush, 1977).

As interesting as the details of these matters are, we cannot usefully discuss them outside their role to relate a noise measure to a community response measure. The recent development of LWP by CHABA Working Group 69 was accompanied by a well-documented effort (Appendix B, CHABA 1977) to relate the environmental noise measure used by EPA (YDNL) to the form and degree of response by people. The effort clearly succeeds; a non-linear weighting function which relates annoyance to noise is presented, and compares well with the result of 12 social surveys. It is this weighting function and the (seemingly arbitrary) choice that 36.9% "highly annoyed" survey response represents unity (100%) "impact" which produce the weighting function used to calculate LWP.

What is the basis and the reported evidence for this relationship between noise and attitudinal response, and what are the limitations that are inherent in the process of calculating impact? A single attitudinal response, "highly annoyed" was used. The percentage highly annoyed, not the average annoyance, is said to be a consistent and stable indicator of community response to environmental noise. Nineteen transportation noise/attitudinal surveys (from 9 countries) were studied (Schultz, 1973). In this study, a common basis was sought for the different response scales actually used, (i.e., not all surveys had a response category "highly annoyed" nor the same number of response intervals), and noise data was carefully converted to YDNL. Twelve of the 13 surveys that lent themselves to a common response basis showed noise versus attitudinal response curves that clustered closely about an average curve. The others did not, although their curves had similar shape, and the average of all seven matched the average of the 12. The spread of the data from the "clustering" surveys is shown in Figure 1. As a result, the CHABA document proposes a "universal" response curve for "percent highly annoyed."

Does the scatter seen in Figure 1 mean that random errors crept into the records of the survey researchers? Probably not. It could come from the conversion of the survey noise measure to YDNL, but only a very small effect is likely. It could come from the conversion of the response scale to "highly annoyed" and a somewhat greater effect is likely. It could come from differences in the people's response in one city or country

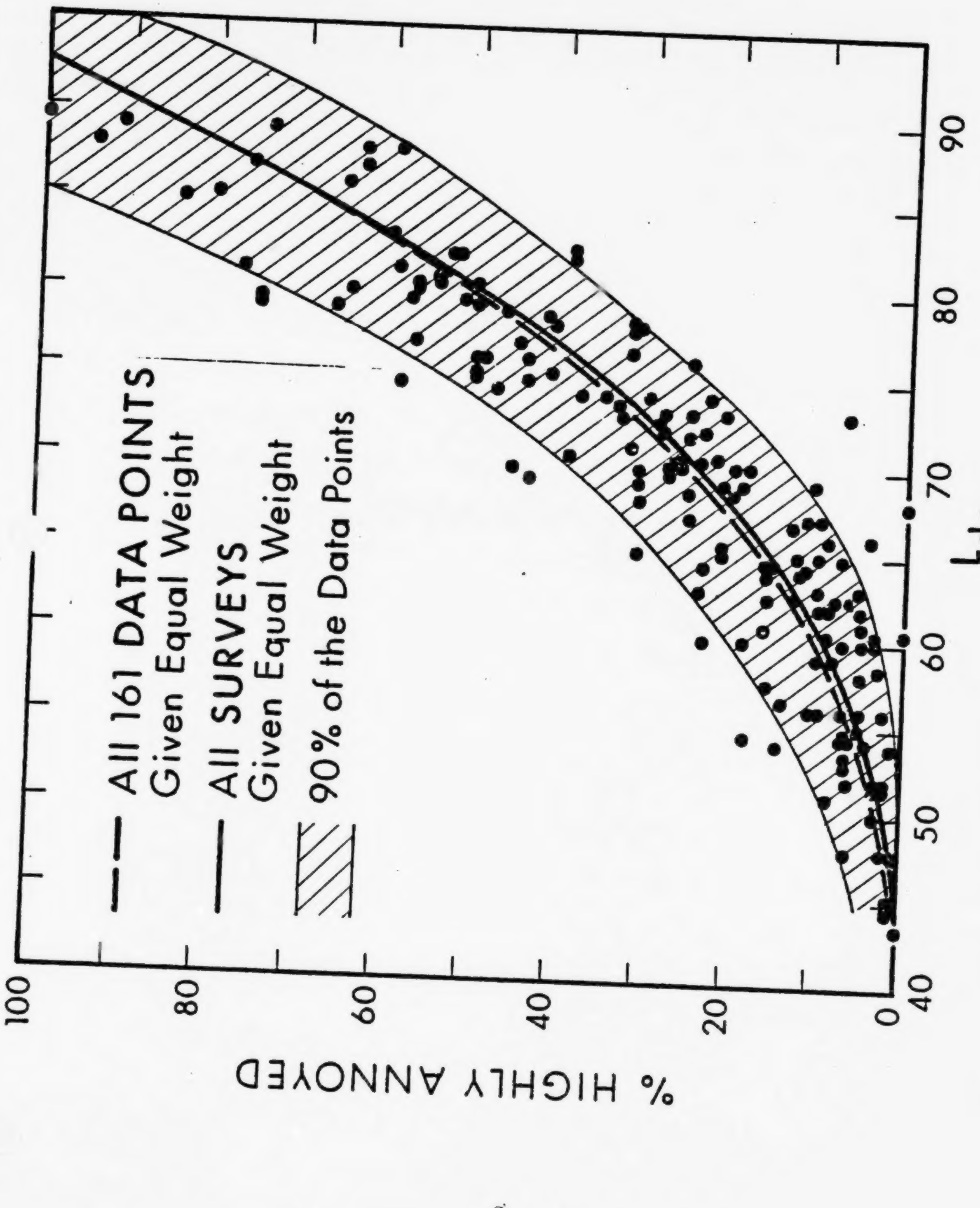

FIG. 1. SUMMARY OF ALL SURVEY DATA POINTS FROM 12 SURVEYS.

compared to another. Finally, the scatter could come from the obvious fact that the outdoor noise in a neighborhood is, much of the time, not the same noise that a resident hears indoors, especially when colder seasons mean that windows and doors are closed. It is the indoor noise environment in which the respondent is immersed, even if the survey questions are focused on outdoor sources. Taking into account all these factors, it seems too early to conclude that the average response for "percent highly annoyed" is the one true relationship. It is tempting to think so, but it is too early to tell. The individual survey results, shown in Figure B-1 of the CHABA Working Group 69 report (CHABA, 1977), do differ from each other, and are each measures of the response of a certain community to a particular environmental noise. Of the 12 surveys, 7 dealt with aircraft noise, 4 with road traffic, and one with rail noise. Whether any of these, or their average, would be correct for non-transportation noise in another community is not obvious. Moreover, the percentage "highly annoyed" does not automatically define the distribution of the population on the annoyance scale. Indeed, a standardized annoyance scale has not been in use and does not yet exist; a recent discussion of annoyance scales (Bush, 1977) concluded that a pretest would be necessary to select the annoyance scale for the noise survey questionnaire under development for EPA.

Moreover, the most commonly encountered annoyance scales are unipolar; that is, they scale annoyance or disagreeable quality from zero (none) to highly annoyed or very disagreeable. Using such a scale presumes that the sound heard is, at best, without negative impact. Consider the absurdity of getting a unipolar response to a chocolate cake. (The cake, was ... not disagreeable, slightly disagreeable, moderately disagreeable, very disagreeable.) Surely a strong bias against this chocolate cake seems implied in such a scale. Bipolar scales (e.g., ranging from "very agreeable" to "very disagreeable") would be used for cake, and could be used for sound. The results may not be the same as those gotten from a unipolar scale; a survey using a bipolar scale yielded a response curve parallel to, but lower than the average shown in Figure 1.

Taking all the limitations just discussed into account, it is possible to use the recent CHABA study to relate the physical stimulus (noise), when quantified as outdoor YDNL, to an estimated attitudinal response when this is expressed as the percentage of the exposed population that would respond "highly annoyed" on a unipolar response scale. The predicted response "highly annoyed" is, as we will see, one of much greater meaning to S/L government than average annoyance. The accuracy of the prediction is a matter of concern; unless one makes the assumption that the CHABA "universal response" is just that, the Ldn = 60 dB could mean 7% or 14% "highly annoyed" as seen in the 12 individual survey curves, or 5% to 20% as seen in the original data points shown in Figure 1.

We must not forget that the impact assessment method proposed by CHABA is not what has been described in the preceding paragraph. As noted at the beginning of this section, their proposal centers on LWP, the sound level weighted population. This is a very useful measure of impact-weighted exposure, but not itself a measure of impact, reaction, or action. The advantages of exposure measures, like ENI or LWP, have practical advantages over purely sound measures such as YDNL or even population distribution by YDNL, and these will be discussed in the last section of this report.

2.2.3 Impact from social survey

A third method is to ask the population of interest in the study what they think about the noise. What noises create the most intense and the most extensive annoyance? How do noise problems (if any) compare in magnitude with other problems of daily life, including other environmental problems and all community problems? There are strong arguments for using this approach. Ultimately, what one wants to know is, given a reasonable time to take effect, whether noise enforcement has reduced the impact of noise on the people. Efforts to reduce sound pressures or to achieve a more favorable distribution of these sounds over time will be useless unless they also reduce the adverse impact of these sounds on the exposed population. Given the current state of the art, community surveys are the best method available to measure these impacts.

From attitudinal survey data a direct impact assessment can be developed in terms of the number of people "highly annoyed" by a specific source (e.g., motorcycles), or by a specific source-situation (e.g., trucks on Route 1 at night). This is a true impact measure.

If the impacted population is weighted by the intensity, a combined measure of extensity and intensity results. To do this, a quantitative relationship between all points on the response scale must be established (e.g., slightly annoyed is X% as bad as highly annoyed). This is conceptually similar to LWP, the exposure measure discussed in the last section, but it is an impact measure. This response scaling procedure has not been established, and the combined measure does not appear to have any advantages over the extensity measure for "highly annoyed" for the evaluation of benefits from noise control enforcement strategies.

Alternatively, the degrees of impact may never be broken out separately but (only) averaged over the population, producing an "average impact." This measure has two distinct disadvantages. First the averaging process also involves creating a scalar (absolute or ratio, not just ordinal) relationship along the response scale, a relationship usually unknown to the respondents, and thus introducing a questionable basis for interpreting the results. Second, average impact, like average depth of a river crossing, does not tell you if there are any deep places. Indeed, what intuitive meaning could one attach to an average score of 3.5 or 2.6 on an annoyance scale?

Many people believe that community attitudinal surveys are inherently imprecise or unreliable. They recommend that physical measures of sound, ranging from the simple to the complex be taken instead, because physical measures have proven to be more sensitive. Changes in the physical noise environment of one dB can be reliably detected with sound meters, but it is said that at least 5 dB is necessary to get a "just noticeable difference" in community attitudes. Much of the difficulty in seeing any measurable response in the community arises from the measurement of the community as a whole, rather than just those neighborhoods or homes that are highly impacted by the source subject to known noise controls. When large area averages are taken, responses from people who feel highly impacted (e.g., because they are more exposed to the source) are diluted by half-hearted responses from people who feel much less impacted by the source of interest, and from people who feel impacted primarily by other sources. If the source noise is reduced 5 dB (say) the only significant reduction in impact can come from those who were highly impacted in the first place. Lumping these people in with the others will reduce the apparent observable effect, perhaps making it undetectable if the average annoyance is the reported measure.

If a survey is to be used to identify benefits from noise control programs that may produce 5 dB or less changes in areas of interest, it will thus be especially important to define each of these areas carefully in terms of single-source situations. A process called "source-situation stratification" is used to construct sample groups of people who reside in a neighborhood that is best characterized by a single source-situation scenario. Such scenarios might include:

- people residing along freeways
- people residing adjacent to a major truck route
- people residing near commercial business strip developments or shopping centers
- people residing near industry or industrial parks
- people residing near a motor racing track or park
- people residing in a single family (or multiple family) dwelling not near any dominant noise source.

There are several ways to locate people for each of these scenarios. A sophisticated acoustical engineering approach would be to generate noise contours on a map of the community for specific source-situations and to identify the exposed population (from which the samples will be drawn) based on these noise contour intervals. This method is quite practical for those scenarios based on freeways, major truck routes, or airports where the noise source has established noise characteristics. A physical measurement survey and more local information would be necessary for other source-scenarios.

The procedure for assessing the benefits of alternative enforcement strategies would seem obvious. Impact would be gotten directly from attitudinal surveys, one before and one after each trial of an enforcement strategy. Let us examine this process in more detail, in order to discuss several biases that arise from non-public health and welfare factors and which could affect the survey results.

The community might want to explore whether one motor vehicle noise enforcement officer using an ANSI Type 1 sound level meter (Strategy A) produces more benefits than two officers, each with a Type 2 meter (Strategy B), and what benefit/cost ratios result. Before the noise enforcement program begins, a survey is conducted, and the community response to motor vehicle noise is tabulated. Then the community noise program is announced, enforcement strategy A is begun and it continues for, say, two months. Another survey is taken at the end of the second month. Next, enforcement strategy B is begun and continues for two months. Finally, a third survey is taken. The data analysis is straightforward, and the benefits are: Benefit(A) = %HA(1) - %HA(2) and Benefit (B) = %HA(2) - %HA(3). These benefits are in percentage changes in the response "highly annoyed". Multiplying these percentages by the exposed population in the appropriate source-situation area (e.g., persons living on a major truck route) converts the benefits into the measure of the people who have benefitted.

In each survey, only a sample of the total exposed population was surveyed. Does it make a difference if it is the same or a different sample? The answer is that it is better to use the same panel because when they are the same, there will be less scatter to the data and samples can be smaller. If the sample is different each time, the individuals do not act as controls for themselves. No bias is expected from the multiple surveys themselves, simply because of the repetition of the questions.

The biases that could affect the data gotten from this series of social surveys arise from several factors, such as social desirability, which arises on an individual basis as a conformance bias, and on a community basis as an advocacy bias, and from the perception of the sincerity of the S/L government's efforts, which introduces a misfeasance bias. How could these biases affect the results just obtained from our community experiment, and how can we correct for or avoid these effects?

The first factor, the respondent's wish to conform to what the respondent sees as the interviewer's desires, can have several effects. The use by the interviewer of a unipolar annoyance scale will be interpreted by the respondent as a desire to assign only negative attributes to noise, whether or not any noise has positive attributes for that person. While this bias should be consistent throughout the series of surveys, it could have an effect on the respondent's use of the low end of the unipolar response scale as noise exposures are reduced, leading to an understatement of the benefits. A respondent may be more likely to select "not disagreeable" if the choices of "moderately agreeable" to "very agreeable" exist than if they do not. A much more pronounced effect of conformance bias arises from the respondent's knowledge, from TV, radio or newspaper coverage, of the community noise control program. The respondent may assume (correctly!) that the second survey is looking for the benefits of the noise program, and may try to "please" the interviewer by overstating a downward shift in annoyance.

A similar bias can occur because the respondent feels part of the community noise control effort (in spirit) and desires to make their community program look good. In either case, the apparent social desirability produces a measurable benefit even if the noise exposure is not reduced at all. This is a real benefit, since the annoyance is reduced, but it is obviously not a benefit due to noise reduction!

Social desirability biases can be discounted if the survey includes questions that test the respondent's desire to conform, and a control population is included that is not expected to benefit from any strategy being evaluated. If, on the other hand, the respondent has or develops doubts about the S/L government's efforts to control noise, these doubts will have the opposite effect, leading to an understatement of the benefits. This misfeasance bias would be likely to shift during the series of surveys. In theory it could be discounted if the sample population were asked to rate the efforts of their government to control noise in, say, five categories. After the original survey the people would be classified into 5 cells by perceived effort and the percentage "highly annoyed" would be tabulated for each cell. Each subsequent survey would repeat the question, and the analysis can then track the change in %HA in each cell. If the changes in %HA are the same for each category, then there is no interaction between perception of government effort and the benefit. If, for example, the %HA decreases in category 5 (the greatest government effort) and stays the same or increases in category 1, then there is an interaction between perceived government effort and annoyance response.

Recalling the experiment and the series of surveys, we have just seen that the benefits (reduction of %HA) due to factors other than noise exposure can be expected to contaminate the attempted measurement of the effects of different enforcement strategies. If the reduction of noise exposure were actually related to %HA by the "universal" response curve described in the previous section, then we could predict the benefits due to the degree to which the enforcement strategies produced reduction in noise exposure. The changes in %HA due to the factors just discussed would be superimposed on the changes due to noise exposure changes. Let us suppose that Strategy A and Strategy B produce modest and equal noise reduction in the homes along Route 1. If the community takes great pride in its new noise control program, the initial benefits due to conformance and advocacy factors could add up to a larger effect than that from Strategy A and the sum overstates Strategy A's effect several fold. If the noise program were to continue to use Strategy A for a long time, the lack of a major noise reduction could lead to a perception of reduction in government effort, a perception not contradicted by the relative invisibility of the one noise control officer in a community of, say, 75,000 population. This will most likely result in a reduction in the benefits that arose from the advocacy factor, and if the effect continues, it will completely offset the original benefit when the negative benefit (increase in %HA) due to disappointment with the government is equal to the modest benefit from the noise exposure reduction. If strategy B were in use at this time, we might conclude it had no effect. Eventually, these non-noise effects may cancel. This should not be surprising; when the public forgets that there is a noise control program, it is in the same state it began in before the noise control program was announced.

The observations made in this and the two preceding sections provide us with the background necessary to resolve the benefit assessment procedure needed for this project.

3.0 SELECTING A BENEFIT ASSESSMENT PROCEDURE

Section 2 has defined "benefit assessment" and described three distinct approaches to the development of a benefit assessment procedure for this project. We now know that measures of source noise or of environmental noise components due to specific sources cannot, in themselves, define impact and thus benefits. Complaints are expressions of impact, but subject to such non-noise biases that they cannot be used to quantify benefits of new or changed noise programs.

Community attitudes to noise can be estimated from physical sound surveys, and these attitudes can be expressed in the percent of the population that is highly annoyed, or alternatively, the total population exposed to the sound of interest that so responds. "Highly annoyed" is a practical and useful response for S/L governments to know about. It is those who feel this way whose voting decisions can be influenced by political decisions about noise control programs, and who will support these programs and the tax expenditures for these programs.

The use of an estimation method, such as that described in the CHABA Guidelines for Preparing an EIS on Noise, depends totally on an input- output relationship between the noise exposure and the attitudinal response of the community. A most serious problem is that, almost by definition, the community we are studying is not one whose noise input-annoyance output relationship helped establish the CHABA "Universal" or any other response relationship. If such data existed for the community of interest, surely it would be used! A similar problem is that the dozen or so noise surveys in other communities dealt only with transportation noise, usually aircraft,and we might be trying to convince a city council or State legislature that grain elevator noise, for example, in their city or State has the same effects as airplane noise near LAX or Heathrow. Perhaps it is true, and some may be satisfied with this statement. In our experience with government officials who must make decisions about spending tax dollars on noise control programs (which often means less for other public health and safety programs), these assumptions are increasingly questioned. The problem of estimation accuracy arises. If (continuing with our example), grain elevator noise is like aircraft noise at LAX and Heathrow, which one is it most like? We have seen that the individual surveys which average to the "universal" relationship give different %HA for a given YDNL value. The government official may well know, from other surveys, how many citizens feel strongly about better street lighting, garbage collection or police protection against crime. Equally precise and well-founded estimates of the population concerned with noise are required. If the estimates available do not appear precise and well-founded, the government will usually be left with no choice but to rely on its on complaint data.

It follows from these observations that when a social survey in the jurisdiction of interest is possible, it can be the most help to S/L governments in quantifying the initial noise impact. With careful planning it can best quantify the benefits throughout a developing and changing noise program as well. We have discussed some of the considerations in the design of such a survey in Section 2.2.3. Since many enforcement strategies are related to particular sources, a measurement of benefits from such sources must focus on that source's impact. The process of source-situation stratification has been described, and would be used to insure that survey populations are those where benefits, if any, could be observed.

The use of a series of surveys introduces all the problems discussed earlier of separating the benefits due to changes in noise exposure from those due to other factors. The community appears to be faced with two choices. The first choice is to conduct a series of surveys with the necessary additional control samples, additional questions and analysis necessary to compensate for conformance and advocacy bias, and to uncover the relationship between misfeasance and annoyance. This survey/analysis process would have to be repeated for each enforcement strategy that was to be evaluated in that community. Community-wide surveys could evaluate more than one enforcement strategy at one time if there were no noise reduction interaction between the strategies. For example, alternative enforcement strategies to control property-line noise from coin-laundries could be tried at the same time with alternative strategies to control motor vehicle (traffic) noise on major arterials, but alternative strategies to control property-line noise from trucking terminals could not. Even with the possibility of evaluating more than one strategy at a time, the evaluation of any number of enforcement strategies for a given source or source-situation will require an equal number of social surveys. Aside from the cost of such surveys, it takes much more time to conduct a survey, and to separate out by analyses the benefits due to the noise exposure reduction, than to estimate the benefit from physical survey data taken before and after the experiment.

Communities may well be impatient and reluctant to see so much time used to measure benefits.

Is estimation, based on a "universal" relationship between noise exposure and percentage highly annoyed, the only other choice? We belive it is not. if a community survey is to be taken in order to find out how bad the noise impact is within the community, then this initial survey can be designed to yield the noise exposure versus percentage highly annoyed relationship for that community. In many cases this relationship can be developed for specific sources or source-situations.

3.1 Noise-Stratified Attitude Surveys

A noise-stratified attitudinal survey can yield this relationship. EPA-ONAC has recently put considerable emphasis on the development of a community attitude survey, and this has led to both the analysis of a number of noise attitudinal surveys (Bush, 1977) and the development of a new survey design (Bush, 1977a). This survey design makes use of a sampling technique based on stratification of the community into eight or more noise zones. Each zone corresponds to a source-situation but not all zones have different source-situations. For example, two zones near an airport are defined: the first includes all the homes within a high noise exposure contour (NEF 40), and the second zone includes the next ring of homes that lie outside the original contour but within a lesser contour (in this case, NEF 30). The stated purpose of introducing this stratification in the sample selection process is to insure that the numerically smaller sub-populations in the community that have high noise exposures are proportionally represented when the total survey sample is drawn. The process guarantees statistical reliability (within limits of confidence) for the total sample for all zones, but not for a single-zone subsample. The population projections for any point on the annoyance scale are likewise only available for the community as a whole. Thus, the survey methodology described does not itself yield noise-stratified results.

If, however, the subsamples were drawn from strata within the community that have substantially the same noise exposures (i.e., in a range of 5-10 dB) and the subsample sizes are as required for statistical reliability within a stratum instead of proportional to the population distribution by strata, then the survey data could be readily analyzed to give the relationship between noise exposure and annoyance response. Such a survey is said to be based on stratified random sample rather than a random sample from the population as a whole. This sample selection process will also permit the exploration of the widest range of noise situations, so that relatively small numbers of people with very high noise exposures are sampled. Further specifying the population of interest by source-situation will permit the identification of a particular community noise situation of interest to the project. Most enforcement strategies are specific to particular sources, and thus a measure of benefits from alternative strategies should be able to focus on a particular source. Thus, the survey data should be separable by source, or better yet, by source-situation.

For example, if the source situation is "people residing near commercial business strip development or shopping centers" then the one noise-stratified sample might be drawn from the first row of residences behind a strip or center. The next stratum might be the next two rows of residences behind, together with the first row (across a parking lot and road), facing the strip or center. The noise exposure, YDNL, estimated from noise surveys, can be used to define the noise strata in standardized estimation procedures, such as those developed for highways and airports, cannot be used. The noise exposure must be known, whether it is based on direct survey measurement of environmental noise in the community, based on measurement near sources with extrapolation to distant points, or estimated from handbook values for source noise level together with non-acoustic data (e.g., traffic data) and handbook procedures for extrapolation to distant points. In any case, it is the noise exposure (e.g., YDNL = 60/65 dB) that defines the stratum, not a word description of the source-situation.

Continuing our example, all parts of the community where the selected source is the dominant noise source would be included in the survey. Since some shopping centers will be noisier than others, and some will be closer to residences than others, we should not expect that the first row of homes behind each shopping center will have the same noise exposure. That is not important. What is important is that all residences near all commercial strips or shopping centers that fall in a given noise exposure stratum be pooled together to assemble the total source-situation and noise-stratified population from which one of the survey samples will be drawn.

How high or low in noise exposure can we go with this stratification? The answer is that each stratum must contain sufficient numbers for statistical reliability. Strata can be made wider to increase the total population in each. If the community is small, then source situations can be combined, so that people near freeways, truck routes, and arterial highways are pooled in the same set of noise strata, or all the population near any dominant noise source is pooled into the same set of noise strata. On the other hand, this need not be carried to extremes. If there are only a very few in a particular source situation, then there is no need for surveys to predict the annoyance response of the total population. Thus, in a very practical sense, if the source-situation is widespread enough in the community and if high levels of noise exposure exist and are expected to produce large %HA, then we may expect that sufficient total population exists to study'by noise-stratified sampling.

Unlike random sampling from the total community, noise-stratified sampling does not preserve the proportional representation of the various noise exposures. Relatively fewer people experience much higher (or much lower) noise exposures than average. If we want to know about the annoyance responses of these people, in order to know how annoyance varies over the widest range of noise exposure, then we need to sample more of these people at the extremes, proportionally, than we need to sample from the people who have near- average noise exposures.

Thus, in getting adequate random samples in each noise stratum, we have not randomly sampled the entire population.

If, in addition to the purposes of this enforcement strategy study the survey data is to be used to assess the overall impact in the community, then the proportional representation produced by a random sample of the entire population is important. This can be constructed from the noise stratified samples, by using the proportions of the total population that fall within each noise stratum.

The ultimate use of the noise-stratified attitude survey is to generate the relationship between YDNL and %HA for the community being studied, or for the source whose control strategy is being studied, and in that context we must discuss what precision is necessary. The relationship should be known precisely enough, in a given application, so that it can reliably detect as small a difference in the benefit as is of interest. The precision of the measure of annoyance, as expressed by the sample variance, is a function of the sample size. To provide a 95% confidence interval that corresponds to a 5% change in %HA (say 20% and 25%) between two samples from different noise strata, the individual sample sizes needed are slightly less than

200. Thus if the population of two adjacent noise strata yielded 20%HA and 25%HA when sampled this way, we would say that this difference is significant (i.e., the %HA is really different in the two strata), and be wrong only one time in twenty. The "universal" response curve suggests that a 10% or greater difference from stratum to stratum would be sufficient to define the relationship for the purpose of this study, and thus we find that fewer than 50 in each sample will be necessary to provide a 95% confidence interval of 10% HA. The actual selection of a confidence interval, the definition of the noise strata, the selection of the sampling area, and the determination of the sampling ratio would, of course, depend on the details of the particular community, and the range of community noise exposure from the source-situation being studied. In this section we have described how the introduction of noise-stratified sampling into a community attitudinal survey can, when combined with an acoustical survey, let us determine annoyance as a function of the environmental noise exposure. This response relationship is specific to a community or a source of interest in the present study.

3.2 Assessing Benefits with a "Specific" Response Curve

A single social survey may be used to assess the magnitude of the community's noise problem and to provide the noise-stratified annoyance data necessary to define the "specific" response relationship for that community. Once this survey data is analyzed, it is possible to know which sources (and source-situations) produce the most widespread high annoyance, as before. For the first time, however, it will be possible to estimate, based on this particular community's demonstrated characteristics, what reduction in the number of people who are highly annoyed by one or more noise source would occur for a certain reduction in the noise exposure due to one or more enforcement procedures. Before-and-after social surveys for each prospective enforcement strategy alternative will not be needed.

The application of this knowledge to the evaluation of the benefits achieved in differing noise impact environments before and after new community programs are enacted is straightforward, and follows what has been discussed in this section. It should be noted, however, that the benefit evaluation of enforcement strategies is not restricted to future experiments (i.e., prospective studies). The procedures and tools developed here can and will be used to evaluate the programs of the past (i.e., retrospective studies). Retrospective studies involve the examination of records collected by a S/L government or others which contain measurements of specific noise sources (or, in some cases, noise environments) both before and after noise controls were imposed by law. Not all the records useful for such evaluation will come from S/L government files; BBN file data on noise sources quieted as a result of noise laws will provide substantial information, otherwise unobtainable, on sources that were quieted in the past, and which may not now even be in operation.

It is not always necessary that the information take the form of before and after noise measurements, since a description of the noise source (e.g., a·continuously operating centrifugal fan with a 10 horsepower motor) together with the NCO's description of the noise control device installed (an XYZ model 30 package silencer) will permit a sufficiently accurate reconstruction of the before and after noise exposures. It is not necessary to know how every source (for a given source control strategy) was quieted; a community-wide projection of the maximum benefits can be based on the sample data available for a few sources, or the minimum benefits can be based on the known source quieting histories.

In either prospective or retrospective studies, the use of the "specific" or if necessary, the "universal" relationship between %HA and YDNL is essential to separate the benefits due to the noise exposure reduction from the benefits (or disbenefits) resulting from non-noise factors. In this way, quantitative assessments can be brought to bear on noise programs which involved substantial publicity about (1) the community problems that led to their development, (2) the enactment of their legal basis, (3) the training and development of enforcement personnel, (4) enforcement acts and penalties meted out to offenders or which involved fewer of these steps. Some communities stop after Step 1, many others after Step 2, and have inactive, rather than active noise programs. Even where there is no enforcement staff or enforcement, there may well be benefits and these may include benefits due to noise exposure reduction. This has occurred under inactive-type noise programs when owners or purchasers of new equipment and facilities "voluntarily" comply with the law, even though there is no enforcement mechanism for that law, and even when there is no law, but only a proposed law or "semi-official" guidelines.

When retrospective studies are to be done, it is unlikely that any social survey data will exist that could be analyzed to yield the "specific" YDNL and %HA relationship for that community. Although such a survey could now be taken, this may not be practical. As suggested above, the CHABA "universal" YDNL-%HA relationship could be used. A more attractive alternative, alluded to earlier, would be to use any and all available relationships for the source-situation(s) relevant to the enforcement strategy, although those relationships come from other communities. In that way, non-noise factors which influence the relationship and arise from source-situation differences are not a problem. It is, after all, easier to believe that residents of single family homes near a freeway in one community have annoyance responses similar to residents in the same source situation in another community, than to believe that they have responses similar to residents of apartments near a railroad in another community.

4.0 ALTERNATIVES TO BENEFIT ASSESSMENTS

The preceding sections of this report have responded to the first task of this study of alternative noise enforcement strategies. Section 1 began by discussing why a quantitative method for benefit assessment was needed; here we will begin by discussing the mechanics of its use.

When benefits are quantified, then the efforts that produce those benefits can be evaluated. The most obvious use of benefit ratings is to weed out those efforts that produce no benefits at all. A more powerful use is to rate program features by their productivity; to derive the ratio of their benefits to the effort necessary to produce those benefits. When the efforts are measured in labor, equipment and facilities costs, then this becomes a cost-benefit ratio. Those who plan and who advise communities on the selection of noise control features can use this information to develop programs tailored to the community's resources yet produce the greatest benefits, in the areas desired, from these resources. What, for example, is the cheapest way to reduce the number of highly annoyed residents along Route 1 by 50%?

Let us examine this benefit-to-cost ratio, identify several components, and explore any alternatives to the use of benefit measures. As we have seen, the benefits arise from noise exposure reductions and also from other non-noise factors associated with a community noise program. Thus, the total benefit is B = B(NR) + B(OTHER); the benefits due to noise reductions are in turn the product of the "specific" response ratio, the change in %HA to the change in YDNL, times the change in YDNL. The response ratio is not a constant, but a function of YDNL, increasing with increasing YDNL. The change in YDNL arises from source or (rarely) path noise control. When path noise control is provided near the source by the owner of the source, it can be represented here as noise reduction for a virtual source although the actual source is not quieted. The change in YDNL can be calculated for the affected location in the community from the change in the (virtual) source level using straightforward sound propagation prediction techniques along with a knowledge of the environmental levels due to other sources. When these are low enough or source reductions are small, so that the source in question is always dominant, source reductions produce equal reduction in the community. Thus, B(NR) can be calculated from source noise reductions.

Changes in physical noise levels are easier and quicker to measure than the resulting benefits. It is easiest to measure the source noise levels rather than the community noise levels due to that source. Although changes in physical noise levels cannot be community benefits as we have defined benefits, they do obviously represent some effect of the noise control program. Let us call them effects, and note that their ratio to the program efforts would be a cost-effectiveness ratio. The reader should attach no magical descriptive powers to the terms "benefit" and "effect"; we have used them in a consistent way only as labels for two distinctly different concepts that need to be distinguished in this study.

The fact that benefits from reductions in environmental noise exposures can be calculated from source noise reductions should tempt us to use cost-effectiveness ratios as a surrogate for cost-benefit ratio. Th former measure promises to be easier and faster to obtain, and the concept is inherently more appealing to those in acoustics whose background is in the physical sciences. There is nothing wrong with this substitution for the investigation of alternative enforcement procedures, provided two conditions necessary for this substitution are kept in mind.

The first condition is that the ratio of benefits to effectiveness must always be used to establish the significance of any effect. Strategies with detectably lower cost/effectiveness ratios do correspond to lower cost/benefit ratios, but the actual benefits may in fact be inconsequential in some cases because either the change is small, or the total population that could benefit from the change is itself small, or was only exposed to levels that produced a small %HA to begin with.

The second condition, unlike the first, does not concern the transformation between effectiveness and benefits, but concerns an underlying premise in our benefit analysis of enforcement strategies, a premise that is easy to forget when cost-effectiveness is the focus of our attention. That premise is that the benefits related to individual enforcement strategies can be usefully evaluated on the basis of their noise exposure reductions alone. In other words, all non-noise related benefits from the overall community noise program can be separated from the noise-reduction related benefits, and thus this analysis assumes no benefits from an enforcement strategy arise from non-noise factors associated with that strategy. This may be true. It would be unwise, however, to forget the possibility that the implementation of some strategies might produce more or less reductions in %HA than would be predicted on the basis of the procedure described in Section 3 alone. This important premise seems remote when effectiveness is being used as an everyday substitute for benefits, but it must be considered in interpreting the results of strategy studies.

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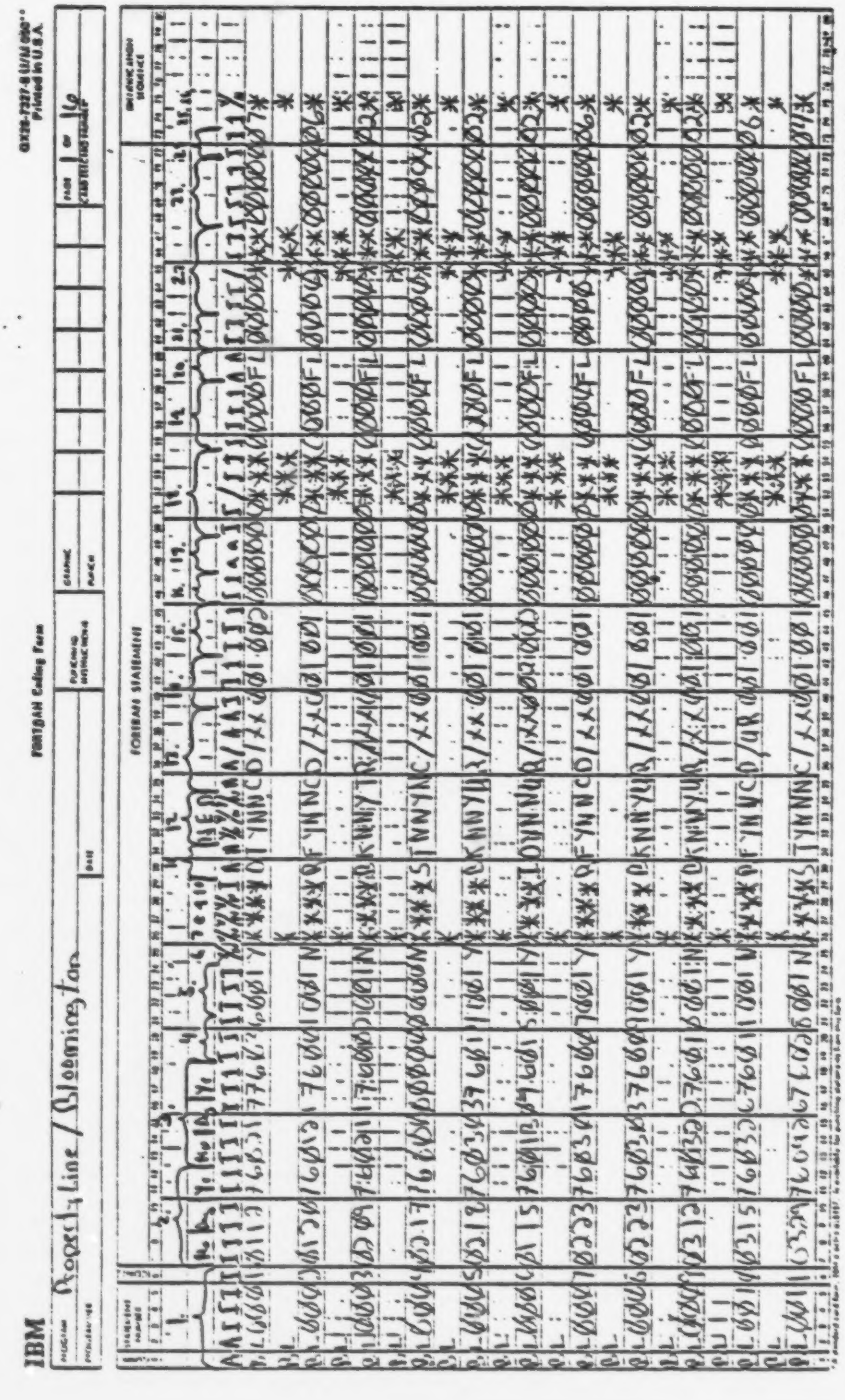
APPENDIX D

COMPLETED CODING FORMS FOR BLOOMINGTON, MN COMPLAINT FILE DATA



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Page 1 of 16

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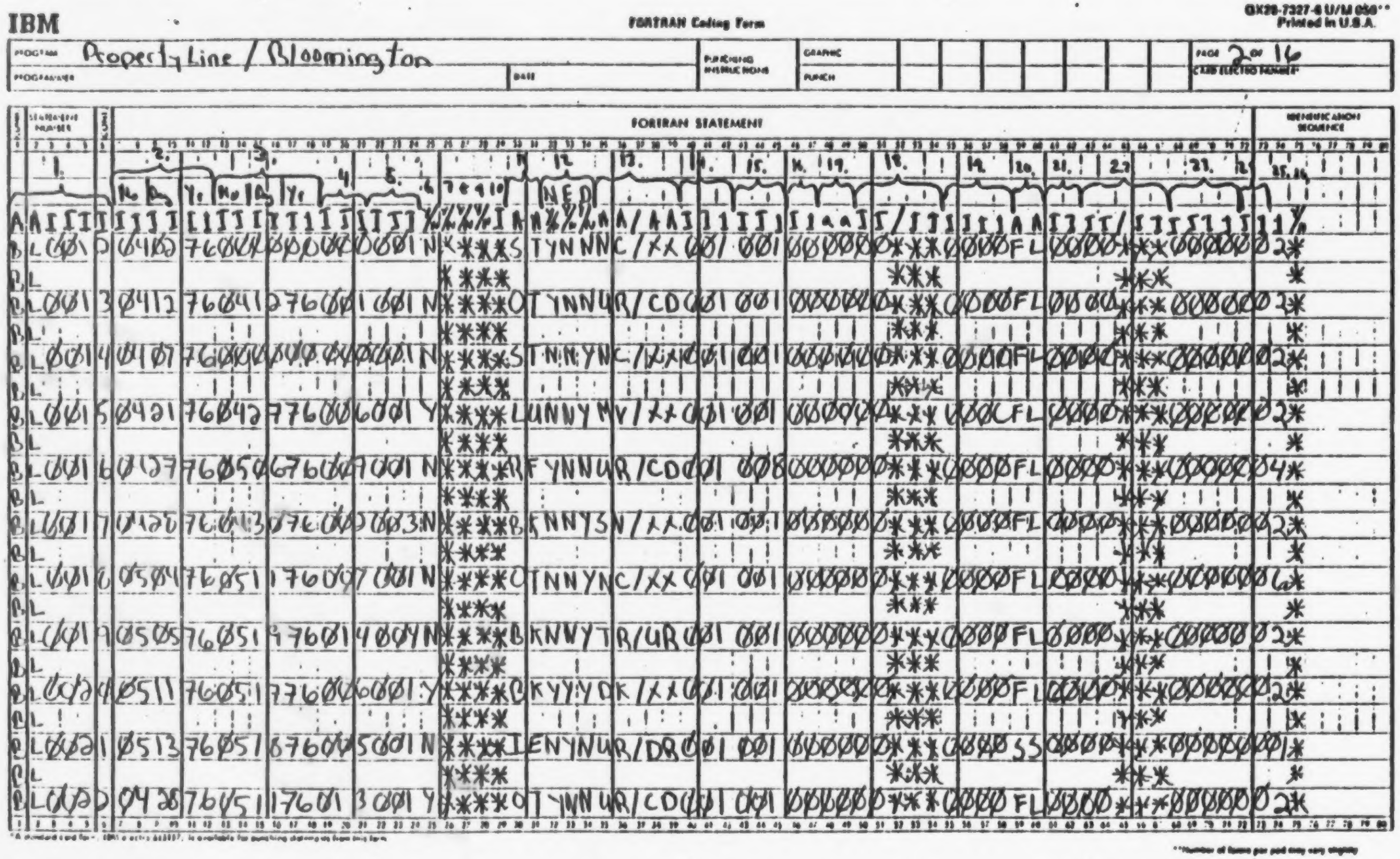

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PAGE 2 OF 16

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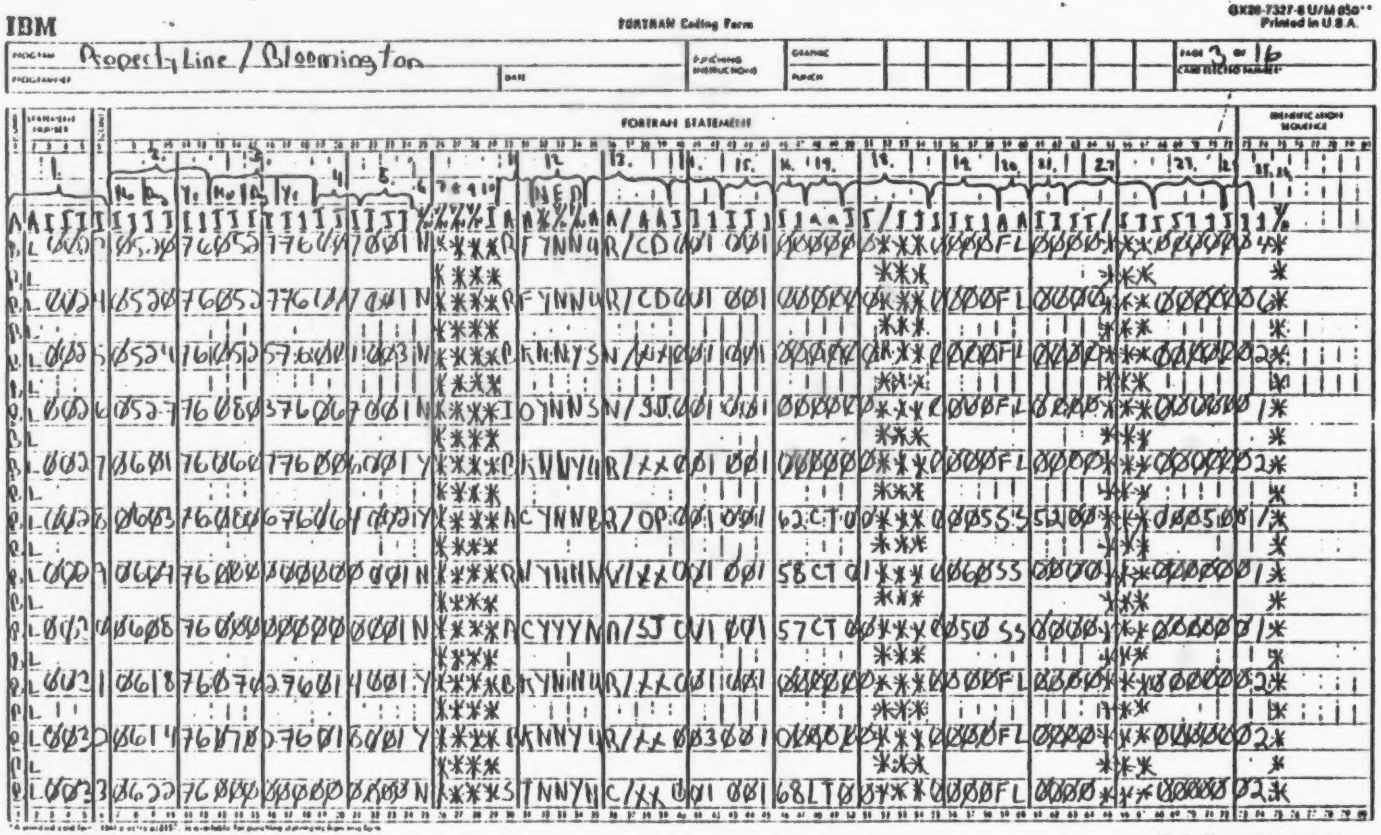

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PAGE 3 OF 16

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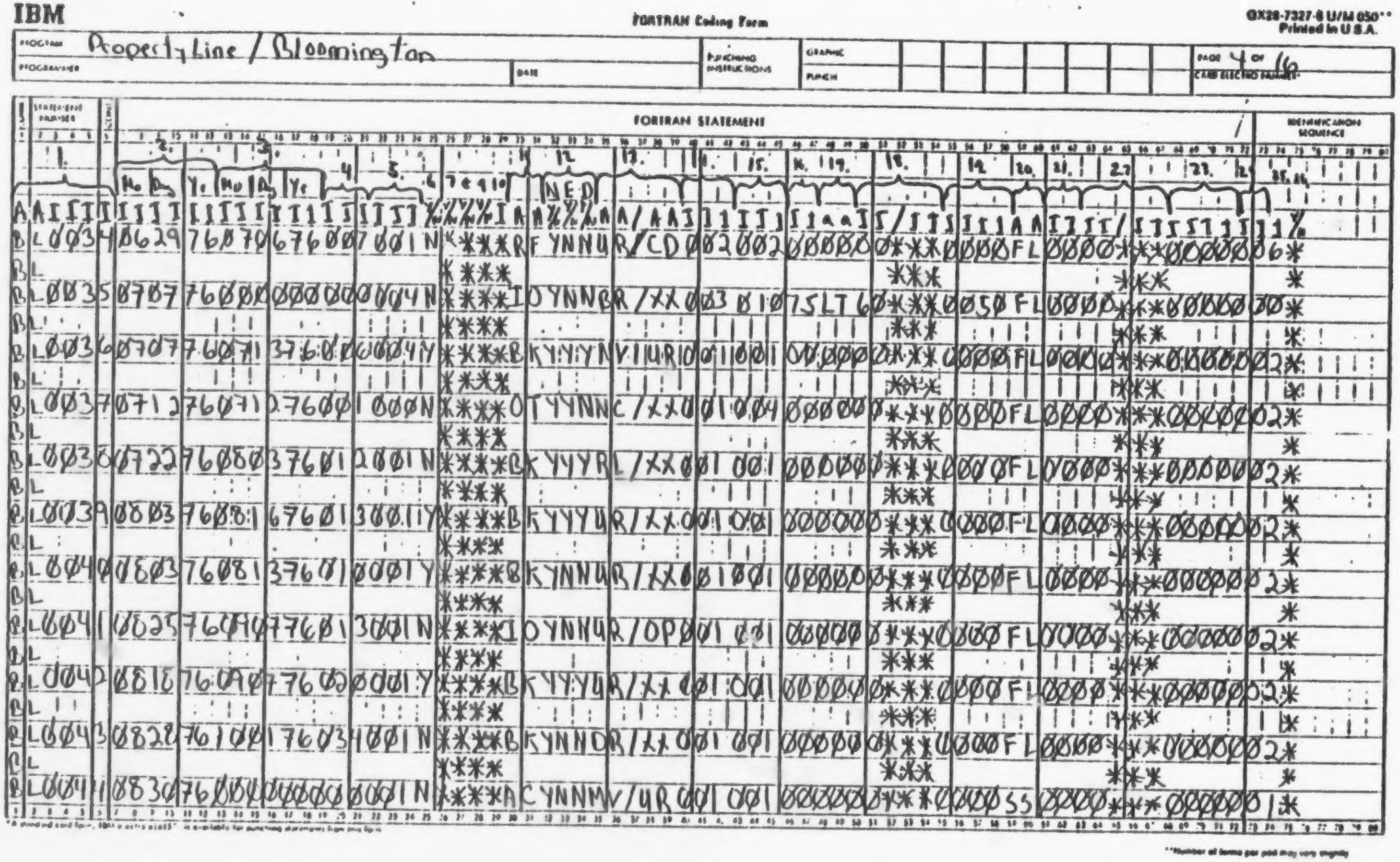

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B L003 6 0707 76071 37600 0004Y ****B KYYYN VIURI 01100 10000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L003 7 0712 76071 27600 1000N ****O TYYNN C/XX0 01004 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L003 8 0722 76080 37601 2001N ****B KYYYR L/XX0 01001 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L003 9 0803 76081 67601 3001Y ****B KYYYU R/XX0 01001 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L004 0 0803 76081 37601 0001Y ****B KYNNU R/XX0 01001 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L004 1 0825 76090 77601 3001N ****I OYNNU R/OP0 01001 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L004 2 0816 76090 77602 0001Y ****B KYYYU R/XX0 01001 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L004 3 0828 76100 17603 1001N ****B KYNND R/XX0 01001 00000 0***0 000FL 0000* **000000 2*
B L                             ***                               ***              **      *
B L004 4 0830 76000 00000 0001N ****A CYNNM V/UR0 01001 00000 0***0 000SS 0000* **000000 1*
```

*A standard card form, IBM electro 888157, is available for punching statements from this form.

**Number of forms per pad may vary slightly

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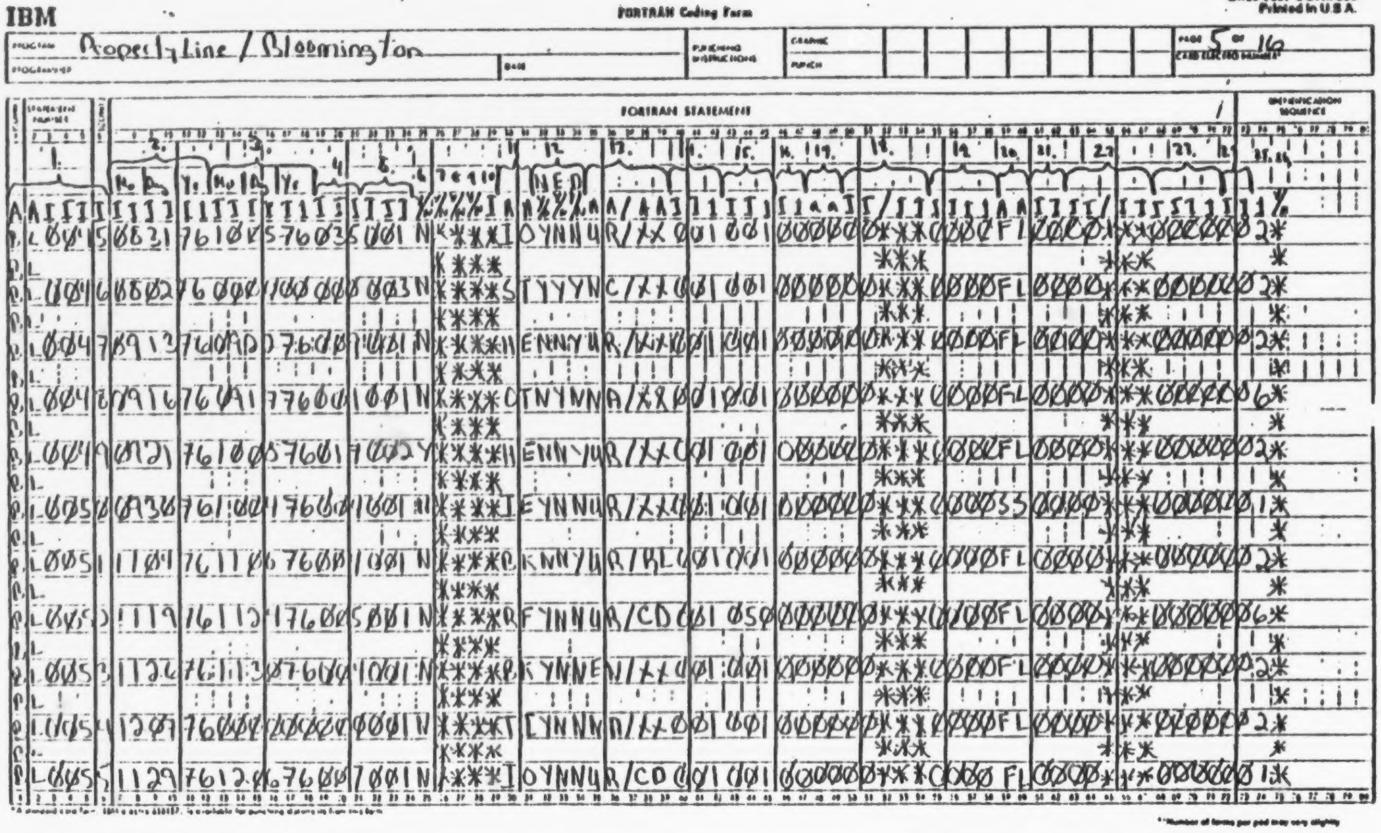

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DATE

PUNCHING INSTRUCTIONS GRAPHIC PUNCH

PAGE 5 OF 16

CARD ELECTRO NUMBER*

STATEMENT NUMBER

FORTRAN STATEMENT

IDENTIFICATION SEQUENCE

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AIIII IIII IIIII IIIII IIIII %%%IA A%%%A A/AAI IIIII IIAAI I/III IIIAA IIII/ IIIIIII 11%
L0015 0621 76105 76035 001N ***I OYNNU R/XX0 01001 00000 0***0 000F1 0000* **000000 2*
L0016 0802 76000 10000 003N ***S TYYYN C/XX0 01001 00000 0***0 000FL 0000* **000000 2*
L0047 0913 760AD 7600 1001N ***H ENNYU R/XX0 01001 00000 0***0 000FL 0000* **000000 2*
L0048 0916 7601 77600 1001N ***C TNYNN A/XX0 01001 00000 0***0 000FL 0000* **000000 6*
L0049 0921 76100 57601 7002Y ***H ENNYU R/XX0 01001 00000 0***0 000FL 0000* **000000 2*
L0050 0930 76100 17600 1001N ***I EYNNU R/XX0 01001 00000 0***0 00035 0000* **000000 1*
L0051 1101 76110 07600 1001N ***R KNNYU R/RL0 01001 00000 0***0 000FL 0000* **000000 2*
L0052 1119 76112 17600 5001N ***R FYNNU R/CD0 01050 00000 0***0 000FL 0000* **000000 6*
L0053 1124 76113 07600 1001N ***R KYNNE N/XX0 01001 00000 0***0 000FL 0000* **000000 2*
L0054 1207 76000 00000 0001N ***T LYNNN N/XX0 01001 00000 0***0 000FL 0000* **000000 2*
L0055 1129 76120 07600 7001N ***I OYNNU R/CD0 01001 00000 0***0 000 FL 0000* **000000 1*
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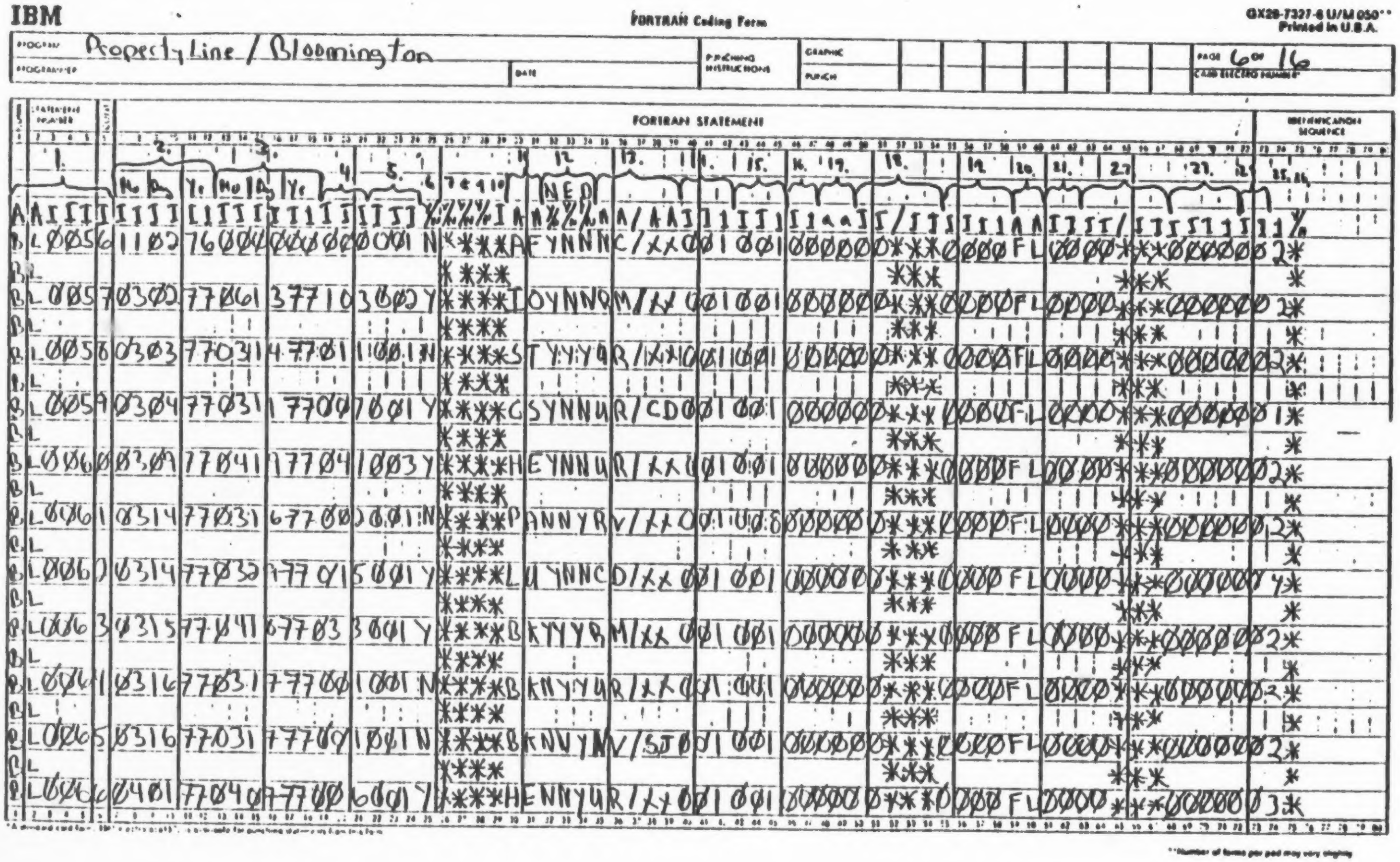
*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly



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PROGRAM Property Line / Bloomington

PROGRAMMER

DATE

PUNCHING INSTRUCTIONS GRAPHIC PUNCH

PAGE 6 OF 16

CARD ELECTRO NUMBER*

STATEMENT NUMBER · CONT. · FORTRAN STATEMENT · IDENTIFICATION SEQUENCE

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  1.      2.         3.          4    5.   6  7 8 9 10  11  12     13.    14. 15.  16. 17.  18.    19. 20.  21.  22   23.  24  25, 26
          Mo Dy  Yr  Mo Dy Yr                               NED
A AIIII I IIII  IIIII IIIII  IIII I  %%%%IA  A%%%A  A/AAI  IIIII  IIaaI  I/III  IIIAA  IIII/  IIIIIII  11%
B L0056 6 1102  76004 00000  0001 N  ***A    FYNNN  C/XX0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0057 7 0300  77061 37710  3002 Y  ***I    OYNNQ  M/XX0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0058 6 0303  77031 47701  1001 N  ***S    TYYYQ  R/XX0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0059 9 0304  77031 17700  7001 Y  ***G    SYNNU  R/CD0  01001  000000 0***0  00UF-L 0000*  **000000 01*
B L                                  ***                                 ***           ***             *
B L0060 0 0309  77041 17704  1003 Y  ***H    EYNNU  R/XX0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0061 1 0314  77031 67700  3001 N  ***P    ANNYR  V/XX0  01008  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0060 ) 0314  77032 17701  5001 Y  ***L    U YNNC D/XX0  01001  000000 0***0  000FL  0000*  **000000 04*
B L                                  ***                                 ***           ***             *
B L0066 3 0315  77041 67703  3001 Y  ***B    KYYYR  M/XX0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0066 1 0316  77031 77700  1001 N  ***B    KNYYU  R/XX0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0066 5 0316  77031 77700  1001 N  ***B    KNVYM  V/SJ0  01001  000000 0***0  000FL  0000*  **000000 02*
B L                                  ***                                 ***           ***             *
B L0066 6 0401  77040 77700  6001 Y  ***H    ENNYU  R/XX0  01001  000000 0***0  000FL  0000*  **000000 03*
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*A standard card form, IBM electro 888157, is available for punching statements from this form

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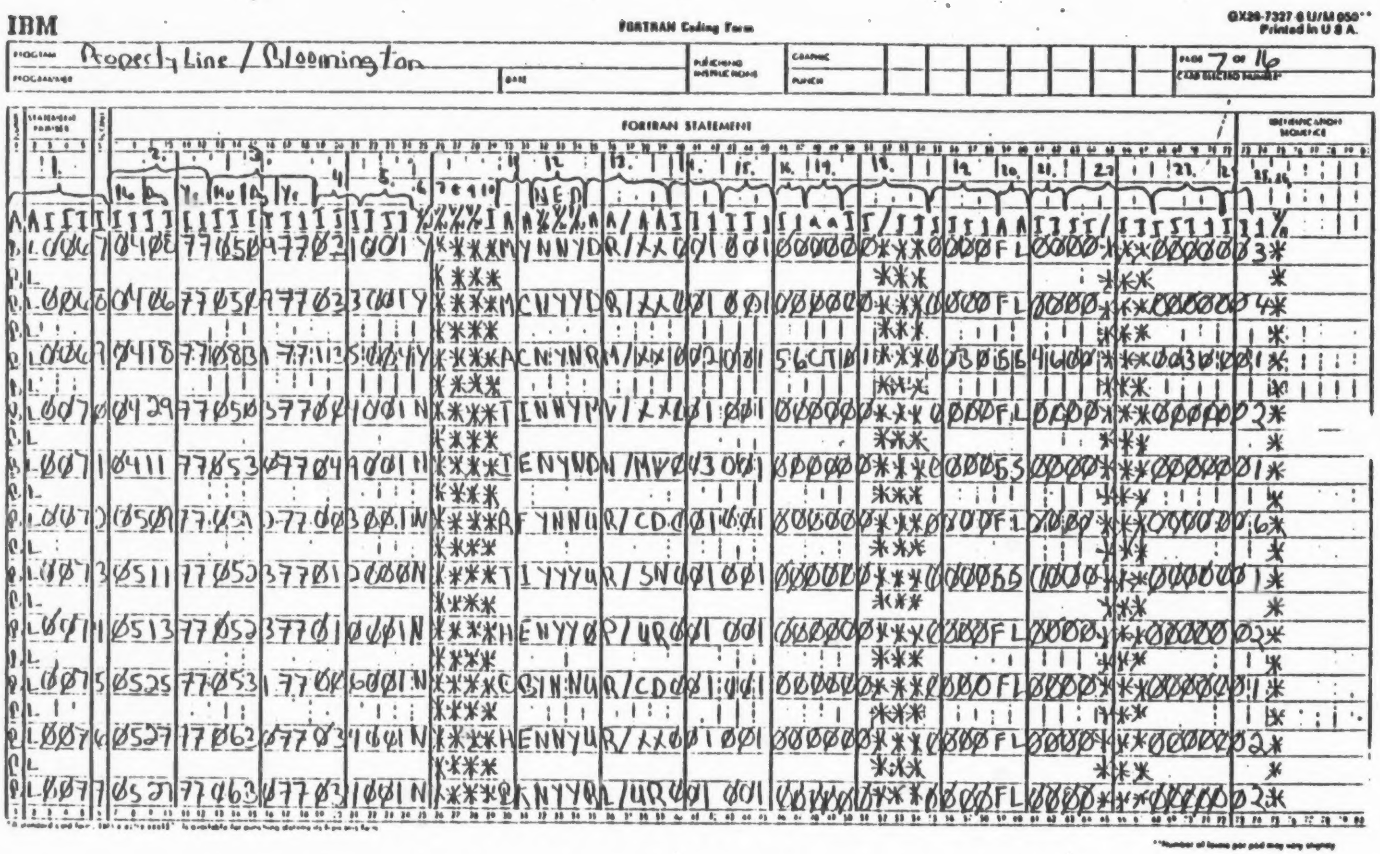

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PROGRAMMER

DATE

PUNCHING INSTRUCTIONS GRAPHIC PUNCH

PAGE 7 OF 16

CARD ELECTRO NUMBER*

STATEMENT NUMBER

FORTRAN STATEMENT

IDENTIFICATION SEQUENCE

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 1.      2.      3.          4      5.   6  7 8 9 10  11  12    13.     14.  15.  16. 17.  18.     19   20   21.   22    23.  24  25.26.
         Mo Da  Yr Mo Da  Yr                         NED
AIIII I IIIII IIIII IIIII IIII% %%%IA A%%%A A/AAI IIIII IIAAI I/III IIIAA IIII/ IIIIIII 11%
L0067 7 0410 77050 97702 1001Y ***M YNNYD R/XX0 01 001 000000 ***0 000FL 0000* *000000 03*
L                               ***                              ***              * **        *
L0066 0 0406 77050 97702 3001Y ***M CUYYD R/XX0 01 001 000000 ***0 000FL 0000* *000000 04*
L                               ***                              ***              * **        *
L0067 7 0418 77083 77112 5004Y ***A CNYNR A/XX0 02 001 56CT10 1***0 03056 4600* *003000 01*
L                               ***                              ***              * **        *
L0070 0 0429 77050 57704 1001N ***T INNYP V/XX0 01 001 000000 ***0 000FL 0000* *000000 03*
L                               ***                              ***              * **        *
L0071 1 0411 77053 07704 A001N ***T ENYWD N/MV0 43 001 000000 ***0 00053 0000* *000000 01*
L                               ***                              ***              * **        *
L0072 2 0500 77052 07700 3001W ***R FYNNU R/CD0 01 001 000000 ***0 000F1 0000* *000000 06*
L                               ***                              ***              * **        *
L0073 3 0511 77052 37701 2000N ***T IYYYU R/SN0 01 001 000000 ***0 00055 0000* *000000 01*
L                               ***                              ***              * **        *
L0074 4 0513 77052 37701 0001N ***H ENYY0 R/UR0 01 001 000000 ***0 000FL 0000* *000000 02*
L                               ***                              ***              * **        *
L0075 5 0525 77053 17704 6001N ***C GINNU R/CD0 01 001 000000 ***0 000FL 0000* *000000 01*
L                               ***                              ***              * **        *
L0076 6 0527 77062 07703 1001N ***H ENNYU R/XX0 01 001 000000 ***0 000FL 0000* *000000 02*
L                               ***                              ***              * **        *
L0077 7 0527 77063 07703 1001N ***Q KNYYQ L/UR0 01 001 000000 ***0 000FL 0000* *000000 02*
```
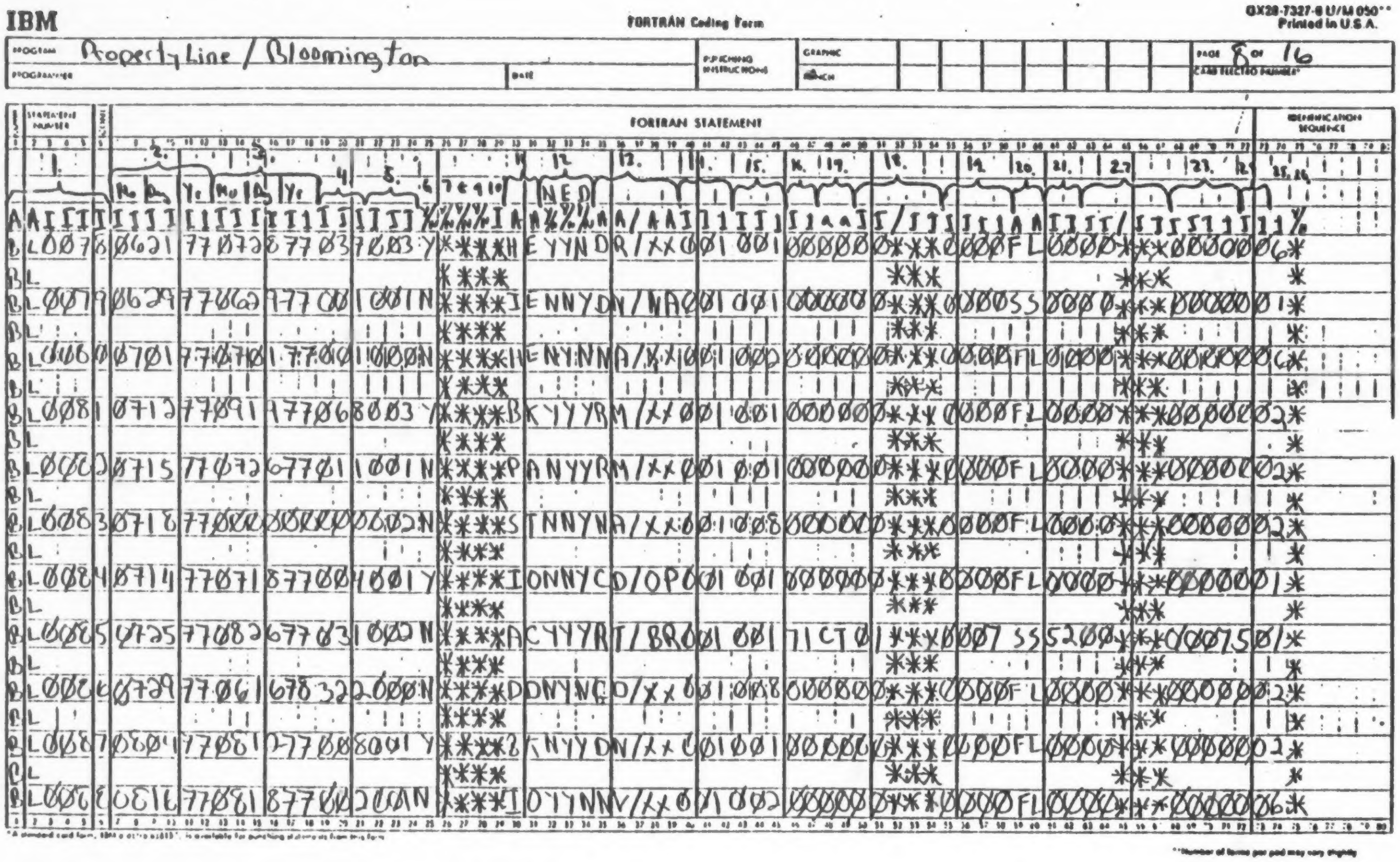

*A standard card form, IBM electro 888157, is available for punching statements from this form.

**Number of forms per pad may vary slightly



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PROGRAM: Property Line / Bloomington
PROGRAMMER:
DATE:
PUNCHING INSTRUCTIONS: GRAPHIC / PUNCH
PAGE 8 OF 16
CARD ELECTRO NUMBER*

STATEMENT NUMBER | CONT. | FORTRAN STATEMENT | IDENTIFICATION SEQUENCE

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 1.    2.          3.        4.   5.  6  7 8 9 10 11  12     13.     14.  15.  16. 17.   18.     19.  20.  21.  22.   23.    24  25,26
       Mo Da  Yr   Mo Da  Yr                      N E D
A AIII I IIII IIIII IIIII IIII %%%%IA A%%%A A/AAI IIIII IIAAI I/III IIIAA IIII/ IIIIIII 11%
BL0078 0621 77072 87703 7003Y ***H EYYND R/XX0 01 001 000000 0***0 000FL 0000* *000000 06*
BL                            ***                            ***               **        *
BL0079 0629 77062 97700 1001N ***I ENNYD N/NA0 01 001 000000 0***0 00055 0000* *000000 01*
BL                            ***                            ***               **        *
BL0080 0701 77070 17700 1000N ***I ENYNN A/XX0 01 000 000000 0***0 000FL 0000* *000000 06*
BL                            ***                            ***               **        *
BL0081 0712 77091 17706 8003Y ***B KYYYR M/XX0 01 001 000000 0***0 000FL 0000* *000000 02*
BL                            ***                            ***               **        *
BL0082 0715 77072 67701 1001N ***P ANYYR M/XX0 01 001 000000 0***0 000FL 0000* *000000 02*
BL                            ***                            ***               **        *
BL0083 0718 77[illegible] [illegible] 0002N ***S TNNYN A/XX0 01 008 000000 0***0 000FL 0000* *000000 02*
BL                            ***                            ***               **        *
BL0084 0714 77071 87700 1001Y ***I ONNYC D/OP0 01 001 000000 0***0 000FL 0000* *000000 01*
BL                            ***                            ***               **        *
BL0085 0725 77082 67703 1002N ***A CYYYR T/BR0 01 001 71CT0 1***0 007 SS 5200* *000750 1*
BL                            ***                            ***               **        *
BL0086 0729 77061 67832 2000N ***D DNYNG D/XX0 01 008 000000 0***0 000FL 0000* *000000 02*
BL                            ***                            ***               **        *
BL0087 0801 77081 27700 8001Y ***[illegible] [illegible]NYYD N/XX0 01 001 000000 0***0 000FL 0000* *000000 02*
BL                            ***                            ***               **        *
BL0088 0816 77081 87700 2000N ***I OYYNN V/XX0 01 002 000000 0***0 000FL 0000* *000000 06*
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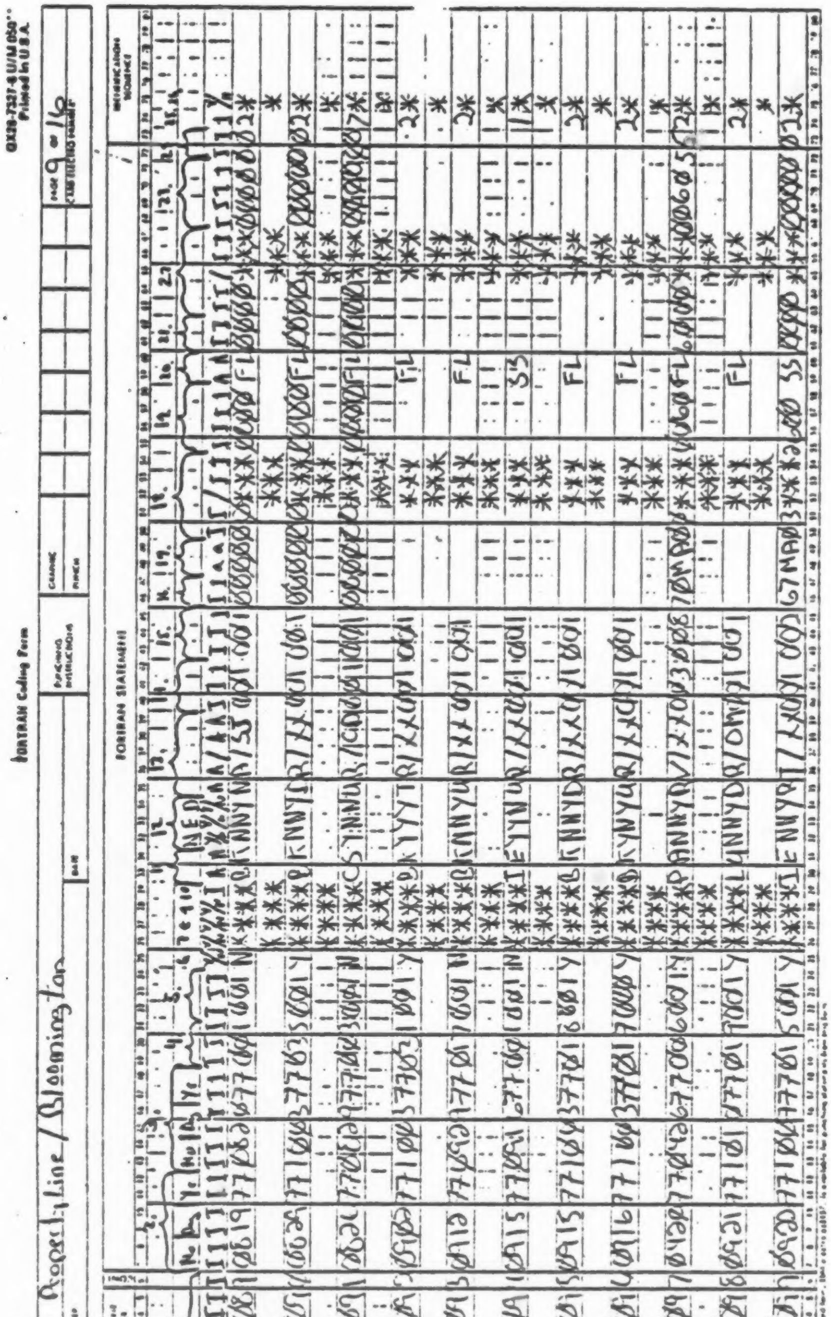
* A standard card form, IBM electro 6509, is available for punching statements from this form

**Number of forms per pad may vary slightly



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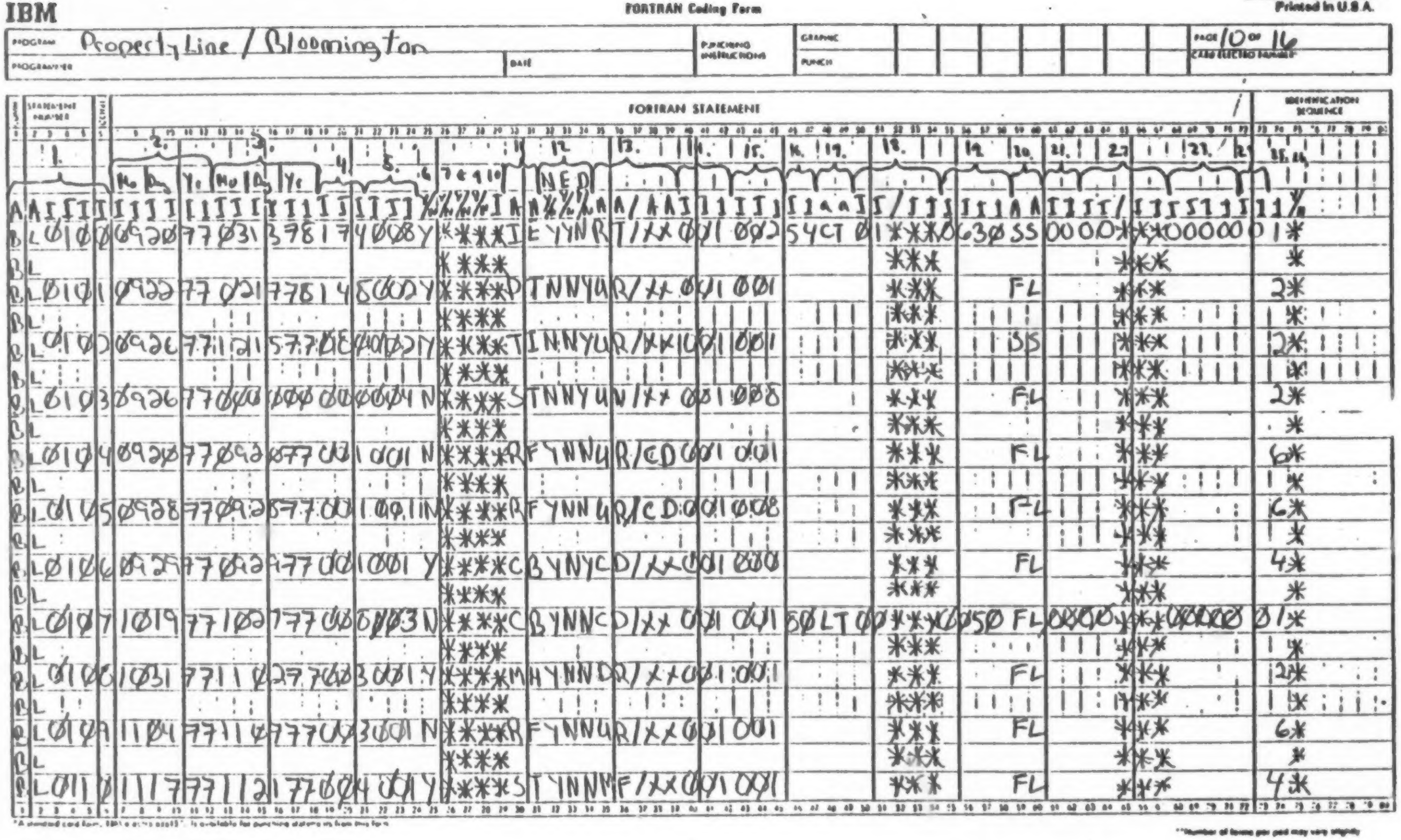
PROGRAM Property Line / Bloomington

PAGE 9 OF 16

FORTRAN STATEMENT



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PROGRAM Property Line / Bloomington
PROGRAMMER
DATE
PUNCHING INSTRUCTIONS GRAPHIC PUNCH
PAGE 10 OF 16
CARD ELECTRO NUMBER*

FORTRAN STATEMENT
IDENTIFICATION SEQUENCE

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  1.    2.      3.       4    5.   6  7 8 9 10 11  12     13.   14.  15.   16. 17.   18.     19   20.  21.  22   23.  24  25.26
       Mo. Da. Yr. Mo. Da. Yr.                    NED
AAIIII IIII IIIII IIIII IIII% %%%%IA A%%%AA A/AAI IIII IIaaI I/III IIIAA IIII/ IIIIIII 11%
BL0100 0920 77031 37817 4008Y ****I EYYNR T/XX0 01 002 54CT0 1***0 630SS 0000* *00000 01*
BL                            ***                         ***               **         *
BL0101 0922 77021 77814 5000Y ****D TNNYU R/XX0 01 001       ***      FL    **         2*
BL                            ***                         ***               **         1*
BL0102 0926 77112 15770E 40002Y ***T INNYU R/XX1 001 001     ***      SS    **         2*
BL                            ***                         ***               **         1*
BL0103 0926 77000 00000 0004N ****S TNNYU N/XX0 01 008       ***      FL    **         2*
CL                            ***                         ***               **         *
BL0104 0920 77092 07700 1001N ****R FYNNU R/CD0 01 001       ***      FL    **         6*
BL                            ***                         ***               **         1*
BL0105 0928 77092 57700 1001N ****R FYNNU R/CD0 01 008       ***      FL    **         6*
BL                            ***                         ***               **         1*
BL0106 0925 77092 77700 1001Y ****C BYNYC D/XX0 01 000       ***      FL    **         4*
BL                            ***                         ***               **         *
BL0107 1019 77102 77700 6003N ****C BYNNC D/XX0 01 001 50LT0 0***0 050FL 0000* *00000 01*
BL                            ***                         ***               **         1*
BL0108 1031 77110 27700 3001Y ****M HYNND R/XX0 01 001       ***      FL    **         2*
BL                            ***                         ***               **         1*
BL0109 1104 77110 77700 3001N ****R FYNNU R/XX0 01 001       ***      FL    **         6*
BL                            ***                         ***               **         *
BL0110 1117 77112 17700 4001Y ****S TYNNM F/XX0 01 001       ***      FL    **         4*
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*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly

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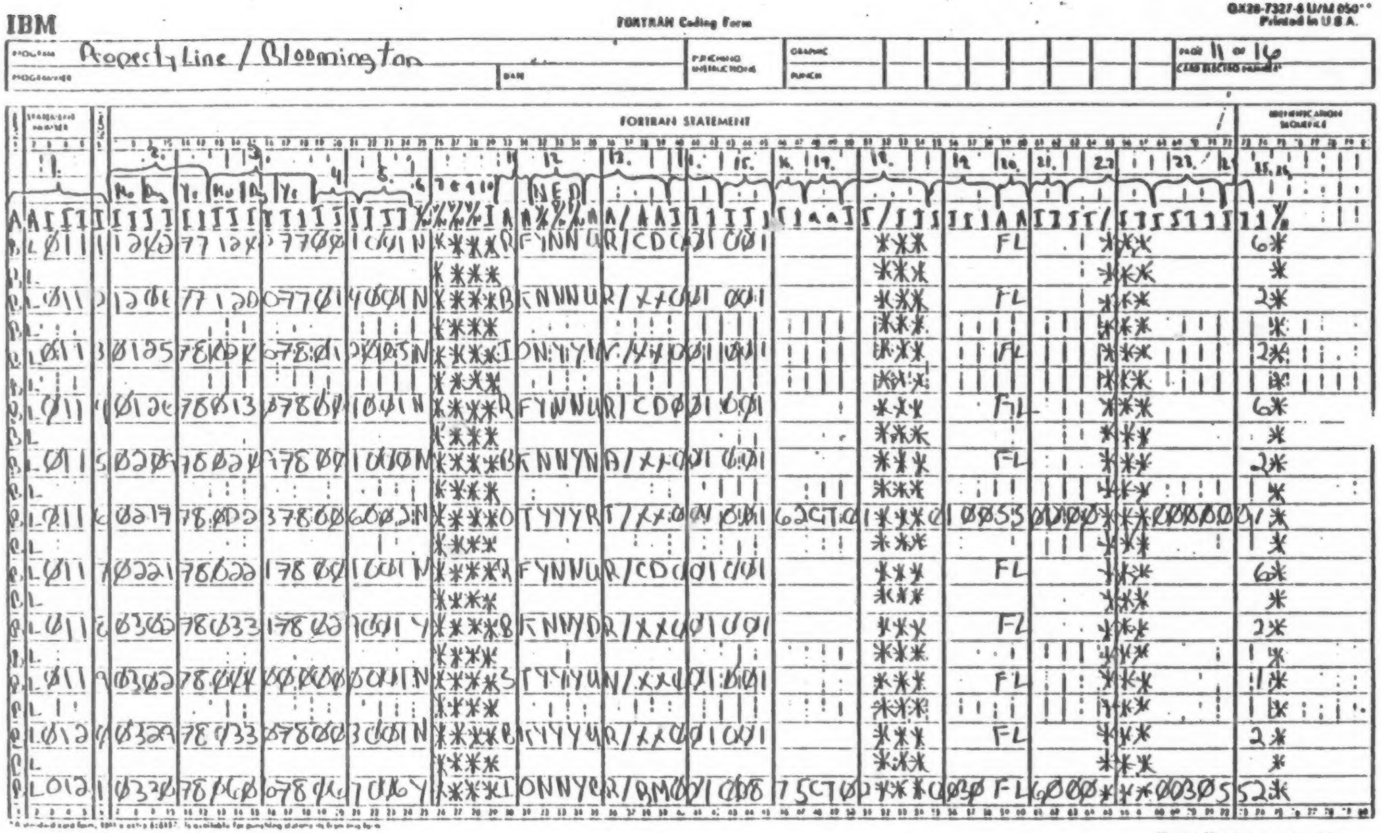

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GX28-7327-6 U/M 050**
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PROGRAM Property Line / Bloomington

PROGRAMMER

DATE

PUNCHING INSTRUCTIONS

GRAPHIC

PUNCH

PAGE 11 OF 16

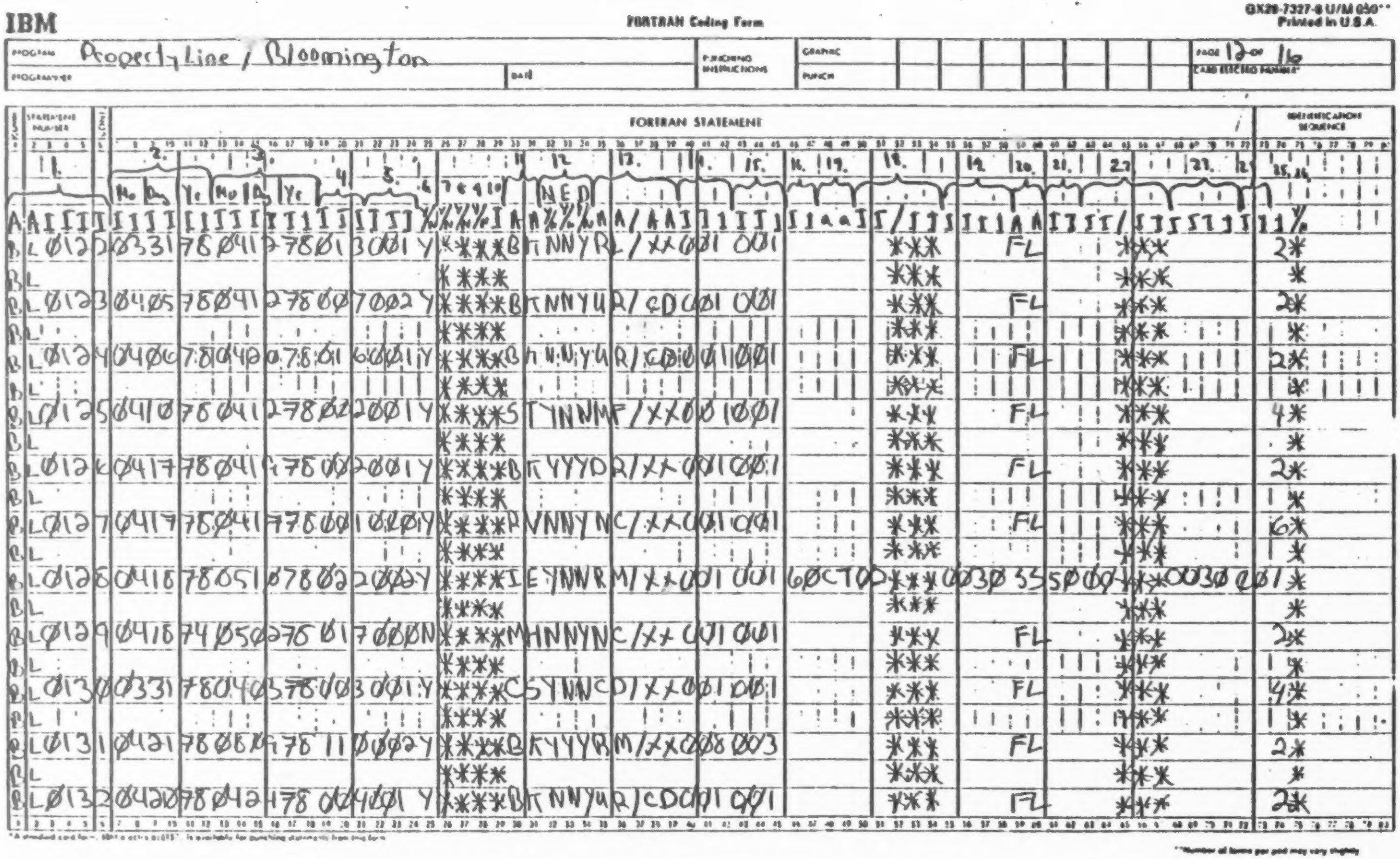
CARD ELECTRO NUMBER*

STATEMENT NUMBER

FORTRAN STATEMENT

IDENTIFICATION SEQUENCE

**Number of forms per pad may vary slightly



IBM FORTRAN Coding Form GX28-7327-6 U/M 050** Printed in U.S.A.

PROGRAM Property Line / Bloomington

PROGRAMMER DATE

PUNCHING INSTRUCTIONS GRAPHIC PUNCH

PAGE 13 OF 16

CARD ELECTRO NUMBER*

STATEMENT NUMBER CONT. FORTRAN STATEMENT IDENTIFICATION SEQUENCE

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 1.    2.         3.         4  5.    6 7 8 9 10 11  12     13.   14. 15.  16. 17.  18.     19  20.  21.  22    23.  24   25,26
       Mo Dy Yr   Mo Dy Yr                           NED
AAIIII IIII IIIIII IIIIII IIII %%%%%IA A%%%AA A/AAI IIIII IIaaI I/III IIIAA IIII/ IIIIIII 11%
BL0122 0331 78041 27801 3001 Y ****B TNNYR L/XX001 001        ***      FL       ***           2*
BL                             ***                             ***               ***           *
BL0123 0405 78041 27800 7002 Y ****B TNNYU R/CD001 001        ***      FL       ***           2*
BL                             ***                             ***               ***           *
BL0124 0406 78040 27801 6001 Y ****B TNNYU R/CD001 001        ***      FL       ***           2*
BL                             ***                             ***               ***           *
BL0125 0410 78041 27802 2001 Y ****S TYNNM F/XX001 001        ***      FL       ***           4*
BL                             ***                             ***               ***           *
BL0126 0417 78041 67800 2001 Y ****B TYYYD R/XX001 001        ***      FL       ***           2*
BL                             ***                             ***               ***           *
BL0127 0417 78041 77800 1001 Y ****P VNNYN C/XX001 001        ***      FL       ***           6*
BL                             ***                             ***               ***           *
BL0128 0416 78051 07802 2002 Y ****I EYNNR M/XX001 001 60CT00 ***0030 55 5P00   ***0030 001   *
BL                             ***                             ***               ***           *
BL0129 0416 74050 27801 7000 N ****M HNNYN C/XX001 001        ***      FL       ***           2*
BL                             ***                             ***               ***           *
BL0130 0331 78040 57800 3001 Y ****C SYNNC D/XX001 001        ***      FL       ***           4*
BL                             ***                             ***               ***           *
BL0131 0421 78060 17811 0002 Y ****B KYYYR M/XX008 003        ***      FL       ***           2*
BL                             ***                             ***               ***           *
BL0132 0420 78042 17800 4001 Y ****B TNNYU R/CD001 001        ***      FL       ***           2*
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*A standard card form, IBM electro 888157, is available for punching statements from this form

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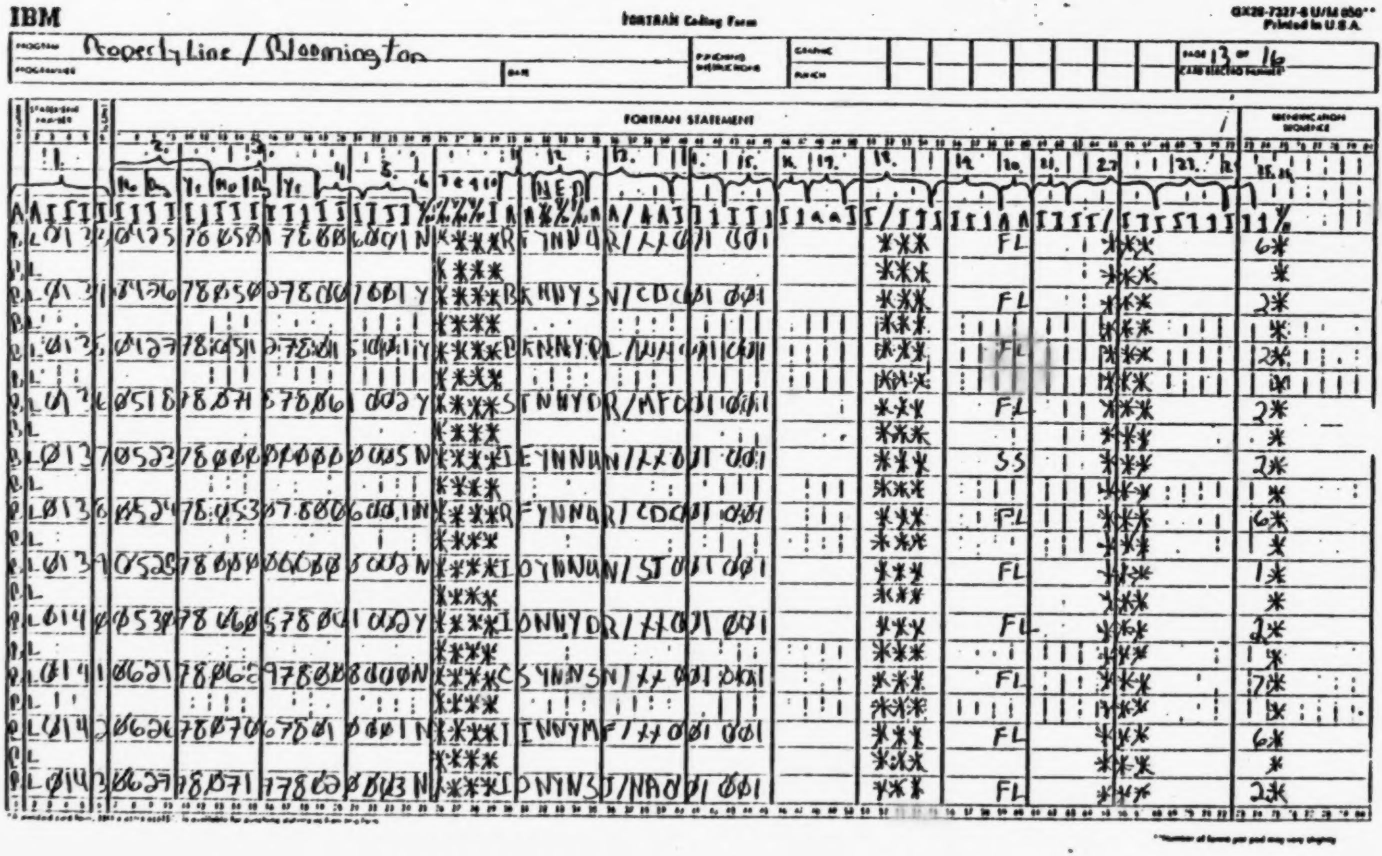

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PROGRAM Property Line / Bloomington PAGE 13 OF 16

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 1.      2.   3.      4     5.    6   7 8 9 10  11  12    13.    14.  15.  16.  17.  18.  19  20.  21.  27   23.  24   25.26.
        Mo Da Yr  Mo Da Yr                         N E D
P L0127 0125 78058 17800 0001N ***R TNNVR/XX001 001   ***   FL  ***  6*
P L                            ***                  ***       ***   *
P L0131 0126 78050 27800 1001Y ***BKNNYSN/CDC01 001   ***   FL  ***  2*
P L                            ***                  ***       ***  1*
P L0135 0127 78051 27801 5001Y ***DKNNYQL/NUN01 C01   ***   FL  ***  2*
P L                            ***                  ***       ***  1*
P L0136 0518 78074 57806 1002Y ***STNNYDR/MFC01 001   ***   FL  ***  2*
P L                            ***                  ***       ***   *
P L0137 0522 78000 00000 0005N ***IEYNNNN/XX001 001   ***   SS  ***  2*
P L                            ***                  ***       ***  1*
P L0136 0524 78053 78000 6001N ***RFYNNNR/CDC01 001   ***   FL  ***  6*
P L                            ***                  ***       ***   *
P L0137 0528 78000 06000 3002N ***IOYNNNN/ST001 001   ***   FL  ***  1*
P L                            ***                  ***       ***   *
P L0140 0530 78060 57804 1002Y ***IONNYDR/XX001 001   ***   FL  ***  2*
P L                            ***                  ***       ***  1*
P L0141 0621 78062 97800 8000N ***CSYNNSN/XX001 001   ***   FL  ***  7*
P L                            ***                  ***       ***  1*
P L0142 0626 78070 67801 0001N ***IINNYMF/XX001 001   ***   FL  ***  6*
P L                            ***                  ***       ***   *
P L0143 0627 78071 17802 0013N ***IONYNSJ/NA001 001   ***   FL  ***  2*
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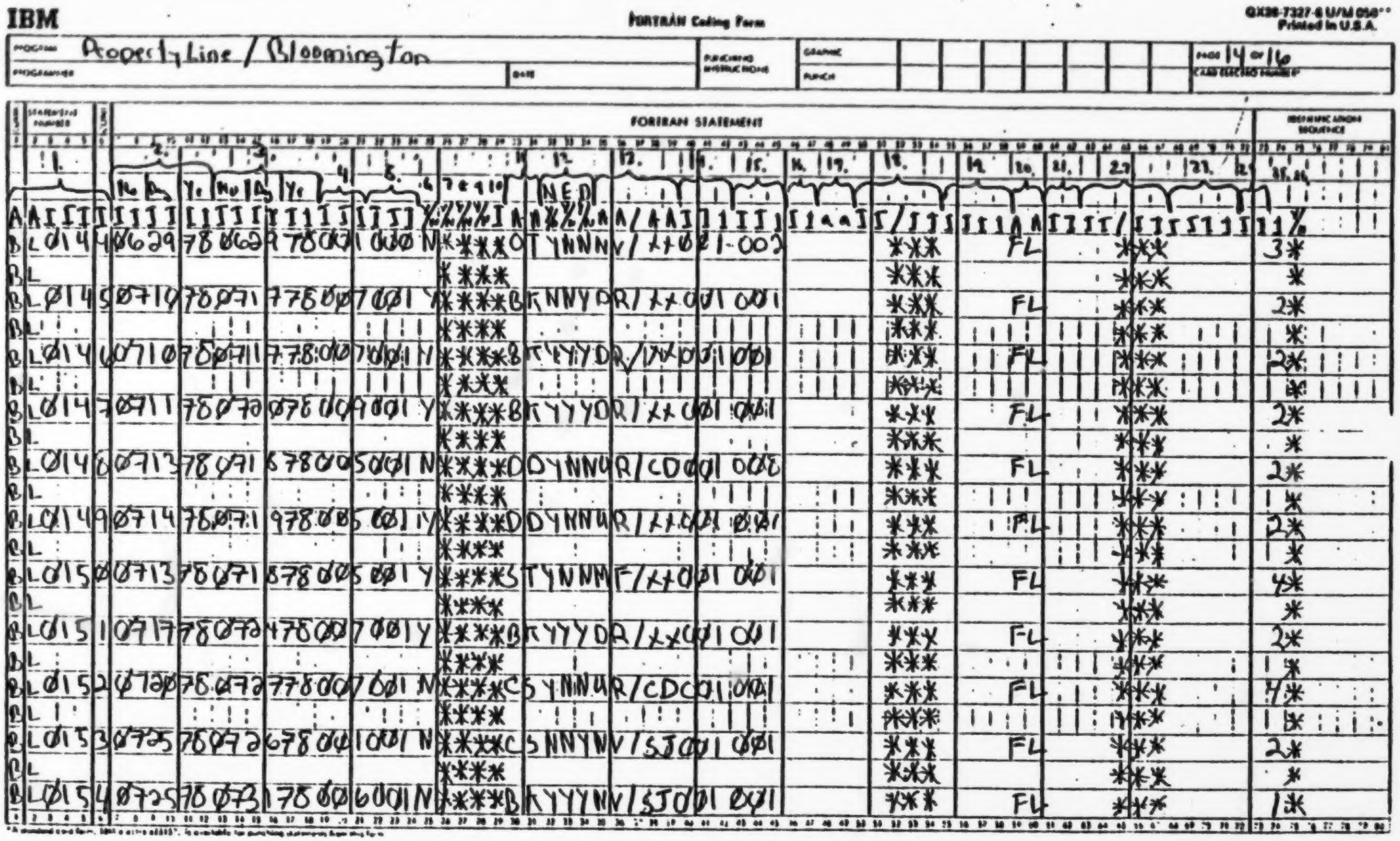
*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly



IBM FORTRAN Coding Form

GX28-7327-6 U/M 050**
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PROGRAM Property Line / Bloomington
PROGRAMMER
DATE
PUNCHING INSTRUCTIONS GRAPHIC PUNCH
PAGE 14 OF 16
CARD ELECTRO NUMBER*

FORTRAN STATEMENT

IDENTIFICATION SEQUENCE

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  1.      2.         3.         4      5.     6  7 8 9 10  11  12     13.    14.   15.     16. 17.   18.     19.  20.  21.  22.   23.  24  25. 26.
          No Bl  Yr  Mo Da  Yr                              N E D
A AIIII I IIII IIIII IIIII IIII %%%%%I A A%%%A A/AAI IIII IIaaI I/III IIIAA IIII/ IIIIIII II%
BL0144 4 0629 78 0629 78 007 1 000 N ***O TYNNN V/++0 21-002  ***  FL  ***  3*
BL                                   ***                      ***       ***   *
BL0145 0714 78 071 778 00 7 001 Y  ***B KNNYD R/++0 01 001    ***  FL  ***  2*
BL                                   ***                      ***       ***  1*
BL0146 0710 78 0711 778 00 7 001 N ***B TYYYD R/++0 01 001    ***  FL  ***  2*
BL                                   ***                      ***       ***  1*
BL0147 0711 78 0720 078 00 9 001 Y ***B KYYYD R/++0 01 001    ***  FL  ***  2*
BL                                   ***                      ***       ***   *
BL0148 0713 78 071 678 00 5 001 N  ***D DYNNU R/CD0 01 002    ***  FL  ***  2*
BL                                   ***                      ***       ***  1*
BL0149 0714 78 071 978 00 5 001 Y  ***D DYNNU R/++0 01 001    ***  FL  ***  2*
BL                                   ***                      ***       ***  1*
BL0150 0713 78 071 878 00 5 001 Y  ***S TYNNM F/++0 01 001    ***  FL  ***  4*
BL                                   ***                      ***       ***   *
BL0151 0717 78 072 478 00 7 001 Y  ***B KYYYD R/++0 01 001    ***  FL  ***  2*
BL                                   ***                      ***       ***  1*
BL0152 0720 78 072 778 00 7 001 N  ***C SYNNU R/CD0 01 001    ***  FL  ***  4*
BL                                   ***                      ***       ***  1*
BL0153 0725 78 072 678 00 1 001 N  ***C SNNYW V/SJ0 01 001    ***  FL  ***  2*
BL                                   ***                      ***       ***   *
BL0154 0725 78 073 178 00 6 001 N  ***B KYYYN V/SJ0 01 001    ***  FL  ***  1*
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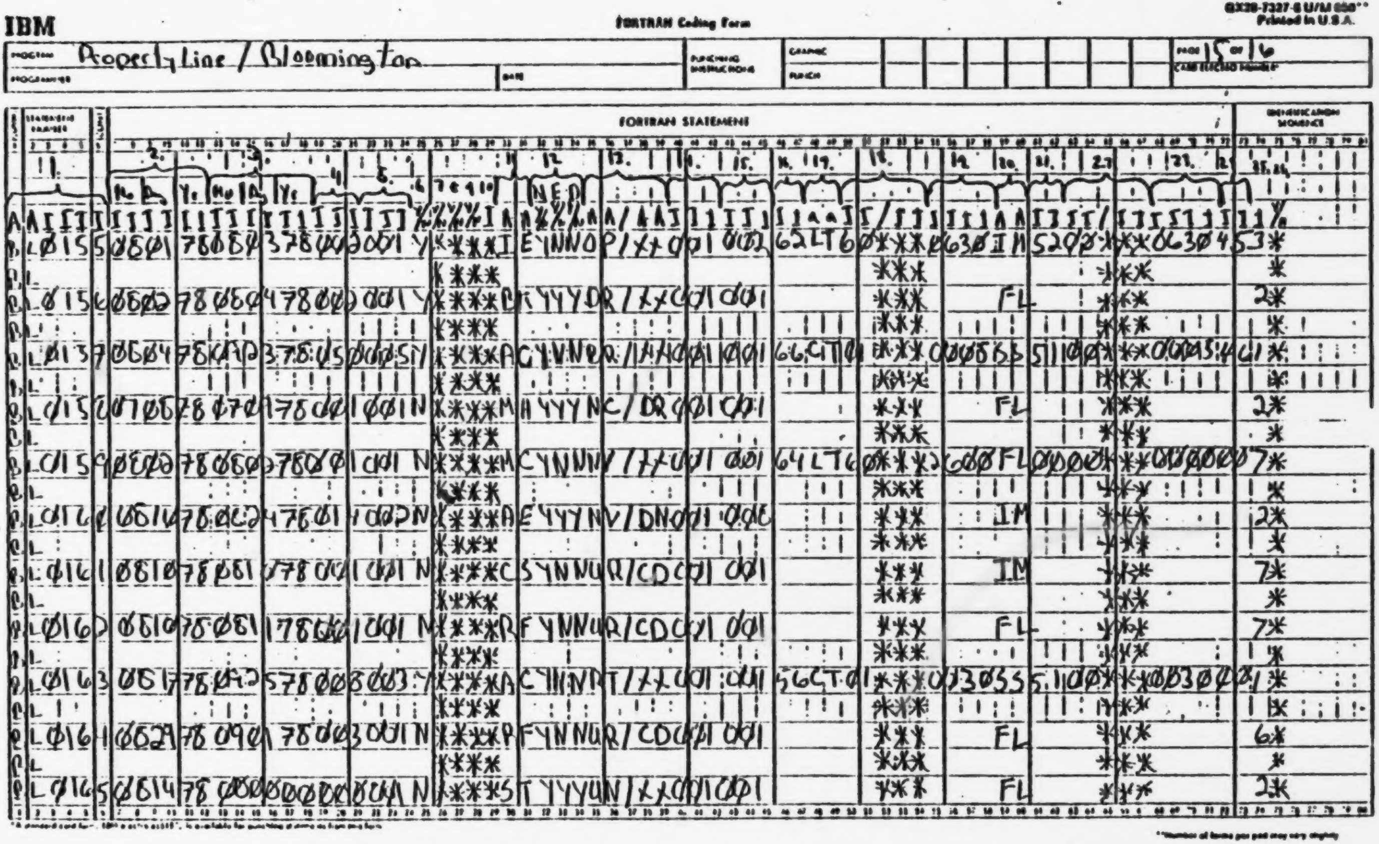

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PAGE 15 OF 16

FORTRAN STATEMENT

IDENTIFICATION SEQUENCE

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        Mo Da Yr Mo Da   Yr                   N E D
A AIIII IIIII IIIII IIIII IIII%%%%%IA A%%AA A/AAI IIIII IIAAI I/III IIIAA IIII/ IIIIIIII 11%
L0155 0801 78084 37800 3001 Y ***I E NNO P/X+0 01 002 62LT6 0***0 630IN 5202* **06304 53*
L                             ****                                ***                ***     *
L0156 0802 78060 47800 0001 Y ***C YYYD R/X+C 01 001           ***    FL          ***     2*
L                             ****                                ***                ***     *
L0137 0604 78K?? 37805 0005 Y ***A GYVNR R/IAH 01 001 66GIT0 ***0 0058B 5110 9* **00095:4 61*
L                             ****                                ***                ***     *
L0155 0706 78070 17800 1001 N ***M AYYYN C/DR0 01 001           ***    FL          ***     2*
L                             ****                                ***                ***     *
L0159 0820 78060 27800 1001 N ***M CYNNN Y/X+U 01 001 64LT6 0***2 600FL 0000* **000000 7*
L                             ****                                ***                ***     *
L0162 0814 78062 47801 1002 N ***A EYYYN V/DN0 01 002           ***    IM          ***     2*
L                             ****                                ***                ***     *
L0161 0810 78081 07800 1001 N ***C SYNNU R/CDC 01 001           ***    IM          ***     7*
L                             ****                                ***                ***     *
L0162 0810 78081 17800 1001 M ***R FYNNU R/CDC 01 001           ***    FL          ***     7*
L                             ****                                ***                ***     *
L0163 0817 78092 57800 3003 Y ***A CYNNR T/X+U 01 001 56CT01 ***0 13055 5100* **003002 1*
L                             ****                                ***                ***     *
L0161 0829 78090 17800 3001 N ***R FYNNU R/CDC 01 001           ***    FL          ***     6*
L                             ****                                ***                ***     *
L0165 0814 78000 00000 0001 N ***S TYYYU N/X+C 01 001           ***    FL          ***     2*
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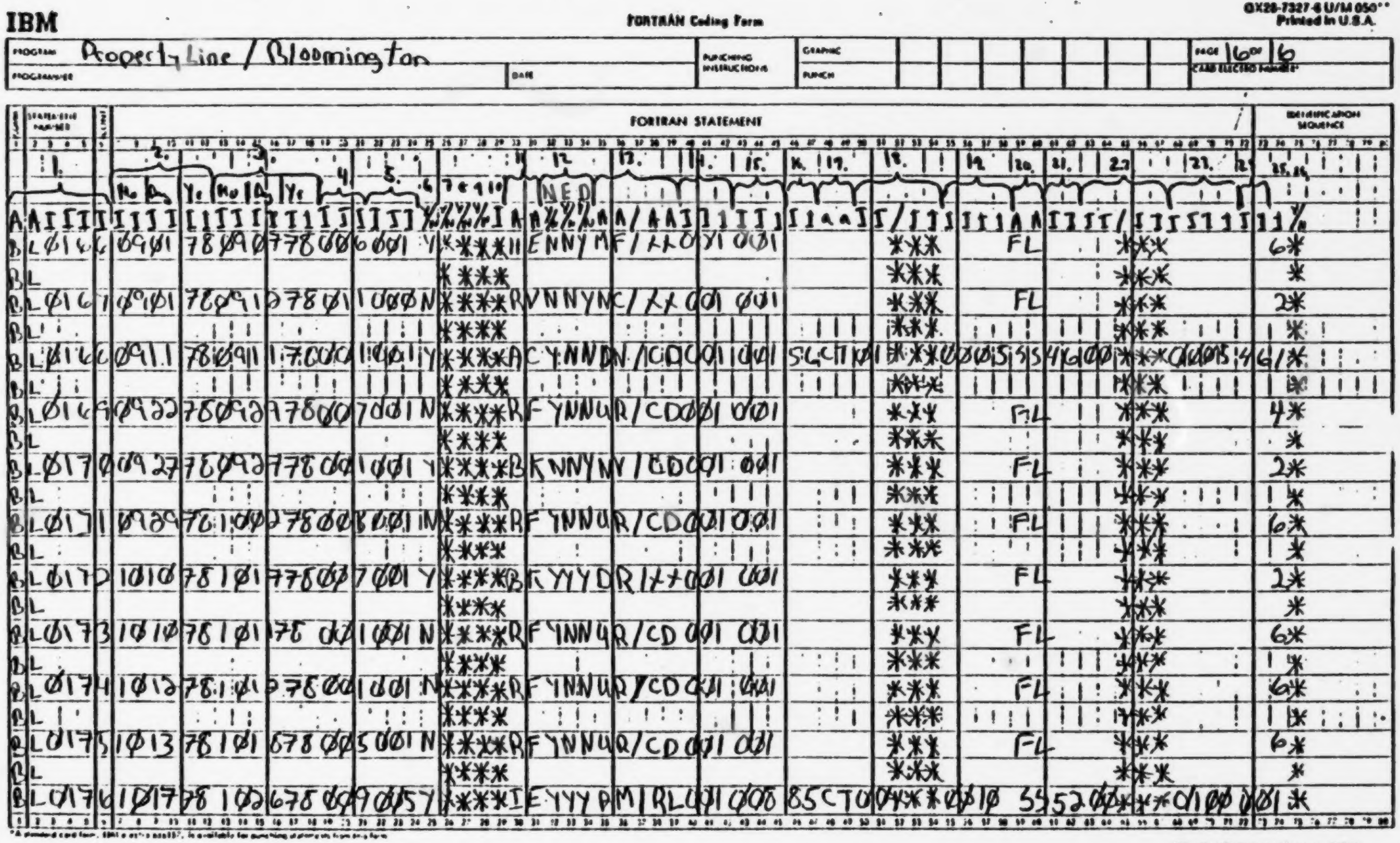
*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly



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DATE
PUNCHING INSTRUCTIONS GRAPHIC PUNCH
PAGE 16 OF 16
CARD ELECTRO NUMBER*

STATEMENT NUMBER · FORTRAN STATEMENT · IDENTIFICATION SEQUENCE

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 1.    2.             3.           4   5.     6 7+9 10 11 12    13.     14.  15.   16. 17.  18.     19  20.  21.  22    23.    24 25,26
       Mo Da  Yr  Mo Da  Yr                          NED
AAIIII IIII  IIIII IIIII  IIII   %%%%IA A%%%A A/AAI IIII  IIaaI I/III IIIAA IIII/ IIIIIII  II%
BL0166 0901  78090 77800  6001Y  ****II ENNYM F/XX0 YI001            ***      FL        ***        6*
BL                               ***                                 ***                ***         *
BL0167 0901  78091 97801  1000N  ***R  VNNYN C/XX0 01001             ***      FL        ***        2*
BL                               ***                                 ***                ***         *
BL0168 0911  78091 17000  1001Y  ***A  CYNND N/CDC 01001  5GCT101    ***0005 55 4600    ***C0005 4 6/*
BL                               ***                                 ***                ***         *
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BL                               ***                                 ***                ***         *
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